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Archaeology and Physical Anthropology

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CONTRIBUTIONS TO ANTHROPOLOGY

V:

Archaeology and Physical Anthropology

CANADA

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Bulletin No. 206
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1967

Foreword

As detailed on its title page, this "Contributions to Archaeology V" continues the National Museum of Canada series previously termed "Contributions to Anthropology, Part I." The present work is the first in the archaeology-physical anthropology series to appear since Bulletin 193 in 1964; the delay has been caused by a marked increase in the work load of the museum's editorial staff. That increase reflects not only the greater productivity of the museum's enlarged scientific staff but also the enlarged programmes of research conducted for the museum through its professional service contracts by scholars in other institutions. In order to reduce publication delays the museum editorial staff has been, and will be further, augmented. Manuscript material on hand underscores that continuing need.

During the interval between the appearance of Bulletin 193 and the present Bulletin 206, the museum's archaeological publications comprised six in the Anthropology Papers series and three monographs (Bulletin 200, "The Cultural Affinities of the Newfoundland Dorset Eskimo" by Elmer Harp, Jr.; Bulletin 208, "Three Prehistoric Iroquois Components in Eastern Ontario" by James F. Pendergast; Bulletin 210, "The Ontario Iroquois Tradition" by J. V. Wright). Another monograph, Bulletin 217, "The Laurel Tradition of the Middle Woodland Period" by J. V. Wright, will soon be available to the public. Also in the process of publication is Anthropology Paper No. 14 ("A Middle Woodland Burial Complex in the St. Lawrence Valley" by M. W. Spence).

In addition to these, the editorial staff has at hand the five papers that will comprise Bulletin 224, "Contributions to Anthropology VI (Archaeology and Physical Anthropology)," the next in this series of studies. It has, as well, George F. MacDonald's monographic manuscript "Debert: A Palaeo-Indian site in Central Nova Scotia." W. E. Taylor's monograph "The Arnapik and Tyara sites: a contribution to the study of Dorset culture origins" should appear in mid-1967.

Since I wrote the Foreword to Bulletin 193 in June 1963, there has been a continuing growth in the numbers of archaeologists and physical anthropologists in Canada, and this museum has shared in that expansion. Dr. William N. Irving joined the staff as head of the Western Canada Section; Dr. David R. Hughes came as head of the Physical Anthropology Section; Dr. George F. MacDonald and Dr. David Sanger are now respectively the British Columbia and Atlantic Provinces archaeologists. Mr. Roscoe Wilmeth accepted a position to develop a programme in Prairie archaeology. Mr. Donald MacLeod joined the Eastern Canada Section and is planning work in the Labrador interior. Miss Susan Whipps is conquering our expanded cataloguing needs. The division's research projects have more than doubled in number since the 1963 summer when I listed fourteen. Rather than see this foreword grow into a paper, I will forego listing either the manuscripts for three monographs and a dozen papers that members of the division have in various stages of preparation or their items in press with various journals.

OTTAWA,
January 1967

WILLIAM E. TAYLOR, JR.,
Chief, Archaeology Division.

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A STUDY OF THE MORPHOLOGY OF THE GLENOID FOSSA

By A. Demirjian, D.D.S., M.Sc.D.*

RÉSUMÉ

On a effectué une étude des détails de la forme et des dimensions de la cavité glenoïde (mandibulaire) en utilisant comme matériel 261 boîtes crâniennes (200 crânes d'homme et 61 crânes de femme) représentant neuf groupes raciaux différents. On a comparé la forme et la structure de la cavité à d'autres structures anatomiques ou de l'appareil dentaire ou du crâne.

On a constaté, contrairement à ce que mentionnent certains rapports antérieurs, que la profondeur de la cavité était sensiblement moins grande dans les crânes de femme que dans les crânes d'homme. On a aussi remarqué des différences morphologiques selon l'origine raciale bien que ces différences n'aient pas été aussi marquées que les différences selon le sexe.

Des trois dimensions de la cavité (profondeur, largeur et longueur), la profondeur constituait la dimension la plus variable; la relation entre la profondeur de la cavité et les dimensions du crâne était moins marquée que la relation entre ou la largeur ou la longueur de la cavité et ces mêmes dimensions. On n'a noté aucune relation digne de mention entre la profondeur de la cavité glenoïde et, d'une part, le manque d'adaptation entre les molaires supérieure et inférieure, et, d'autre part, le degré d'usure des dents. Cette dernière observation diffère aussi de ce qu'on peut lire dans des rapports publiés antérieurement.

En outre, il n'y avait aucune corrélation entre la profondeur de la cavité et les dimensions de l'apophyse ptérygoïde latérale, mais il y avait rapport entre la grosseur de cette apophyse et la longueur de l'épine infra-temporale (qui forme une attache pour le muscle ptérygoïde latéral), d'une part, et le degré d'usure des dents, d'autre part.

On a constaté que l'extremité latérale de l'éminence articulaire était plus saillante dans les crânes plus vieux, ce qui explique peut-être des rapports antérieurs portant que la profondeur de la cavité glenoïde augmente avec l'âge.

SUMMARY

A study of the details of the shape and dimensions of the glenoid (mandibular) fossa was undertaken, using as material 261 skulls (200 male, 61 female) which sampled nine different racial groups. The morphology of the fossa has been compared with other anatomical structures related either to the dental apparatus or to the cranium.

Contrary to some previous reports, it was found that the depth of the fossa was significantly shallower in female skulls than in male skulls. There were also morphological differences on the basis of racial origin, although these were not so marked as was the sex difference.

Of the three dimensions of the fossa (depth, width, and length), the depth was the most independent measurement; depth was less related to measurements of the skulls than were either of the other two dimensions. There was no significant correlation between the depth of the fossa and either the degree of overbite or the degree of wear of the teeth. This latter observation also differs from previously published reports.

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*Submitted in partial fulfilment of the requirements for the degree of Master of Science in Dentistry. Faculty of Dentistry, University of Toronto.

Furthermore, there was no correlation between the depth of the fossa and the size of the lateral pterygoid plate, but the size of this plate and the length of the infra-temporal spine (which forms an attachment for the lateral pterygoid muscle) were both related to the degree of dental wear.

It was found that the most lateral part of the articular eminence was more prominent in older skulls, and this may explain previous reports that the fossa depth increases with age.

INTRODUCTION

The anatomy and physiology of the temporo-mandibular joint have been subjects of interest for many years because of the relation of this joint to the basic function of mastication. Knowledge of joint design and function is important for an understanding of the normal physiology of chewing and of the pathological processes in the dentition and in the joint itself. However, in spite of this long-standing interest, the temporo-mandibular joint is still not fully understood. It is functionally one of the more complex joints of the body since it is really two joints in one, and because of its location some forms of study are denied to investigators. It has been studied rather extensively in dried skulls, in the dissection of cadavers, and, radiographically, in living subjects. Some limited studies have investigated the chewing patterns of individuals whose joint function has been modified either pathologically or surgically.

Beyond the fact that relatively little is yet known of temporo-mandibular joint function, its basic structure in relation to other cranial parts is still not clear. The present study was therefore undertaken to learn more of the fundamental morphology of the bony parts of the joint, particularly the glenoid fossa—its relation to the skull and to factors such as age and race.

ACKNOWLEDGMENTS

I wish to express my sincere thanks to:

Dr. K. J. Paynter, for his sustained and invaluable guidance, his helpful criticism and advice, and his correction of the text, and for the use of facilities in the Research Division, Faculty of Dentistry, University of Toronto.

Dr. J. E. Anderson, for his assistance during the preparation and the publication of this paper and for the use of the facilities of the Department of Physical Anthropology, University of Toronto.

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The Royal Ontario Museum for permission to study some of their material.

The National Museum of Canada for making possible the publication of this paper.

ANATOMICAL DESCRIPTION OF THE GLENOID FOSSA

The glenoid fossa, situated on the horizontal base of the squamous portion of the temporal bone in front of the tympanic plate (Fig. 1, 2, and 3), is an elliptical bony depression forming the cranial part of the temporo-mandibular articulation. Functionally the fossa can be divided into an anterior articulating portion, the articular fossa, and a posterior non-articulating portion (Ashton and Zuckerman, 1954). The dividing line is the squamo-tympanic fissure. Normally the articular fossa contains the mandibular condyle and the articular disc. Sometimes a small part of the parotid gland is found in the posterior part of the fossa.

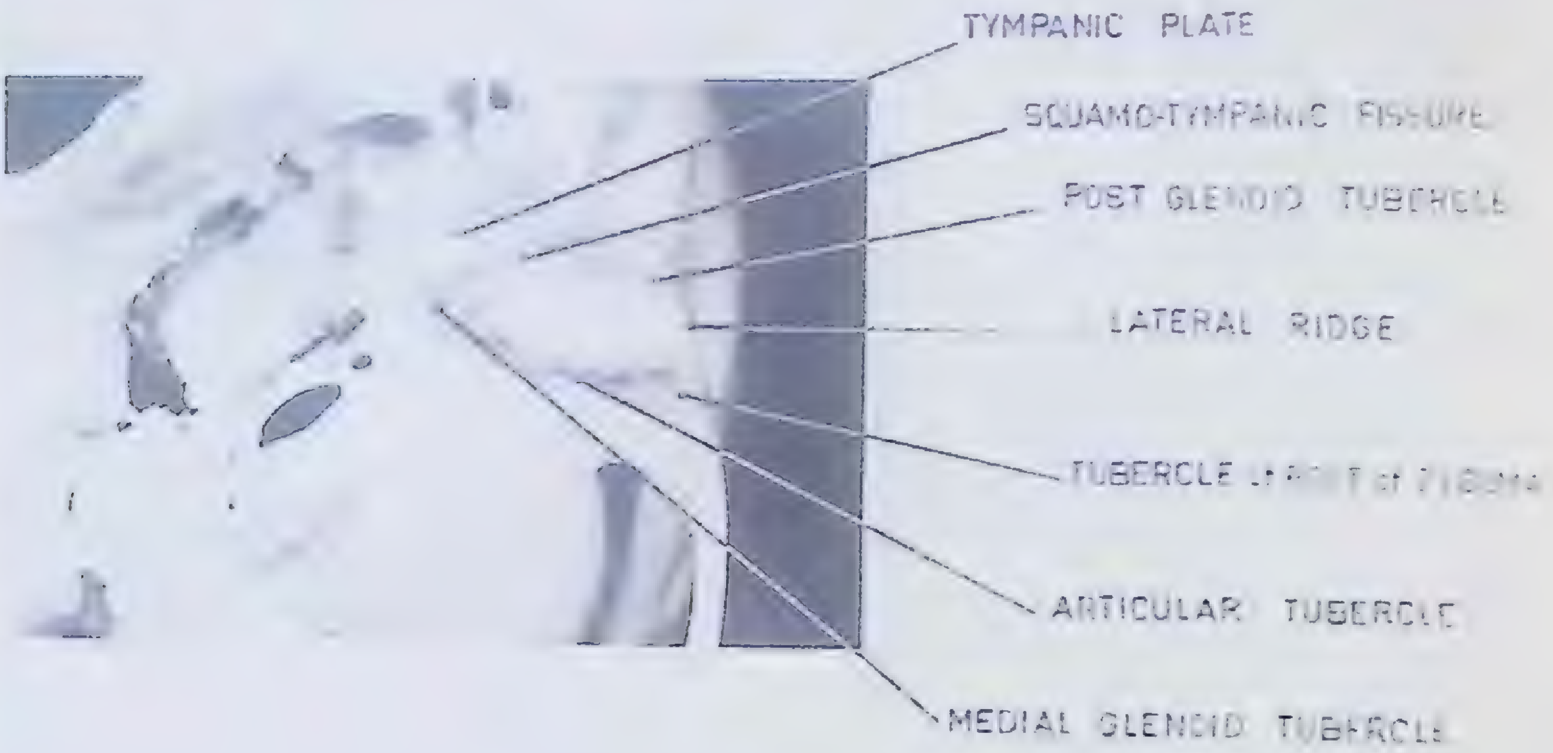

FIGURE 1—*Right glenoid fossa—basal view*

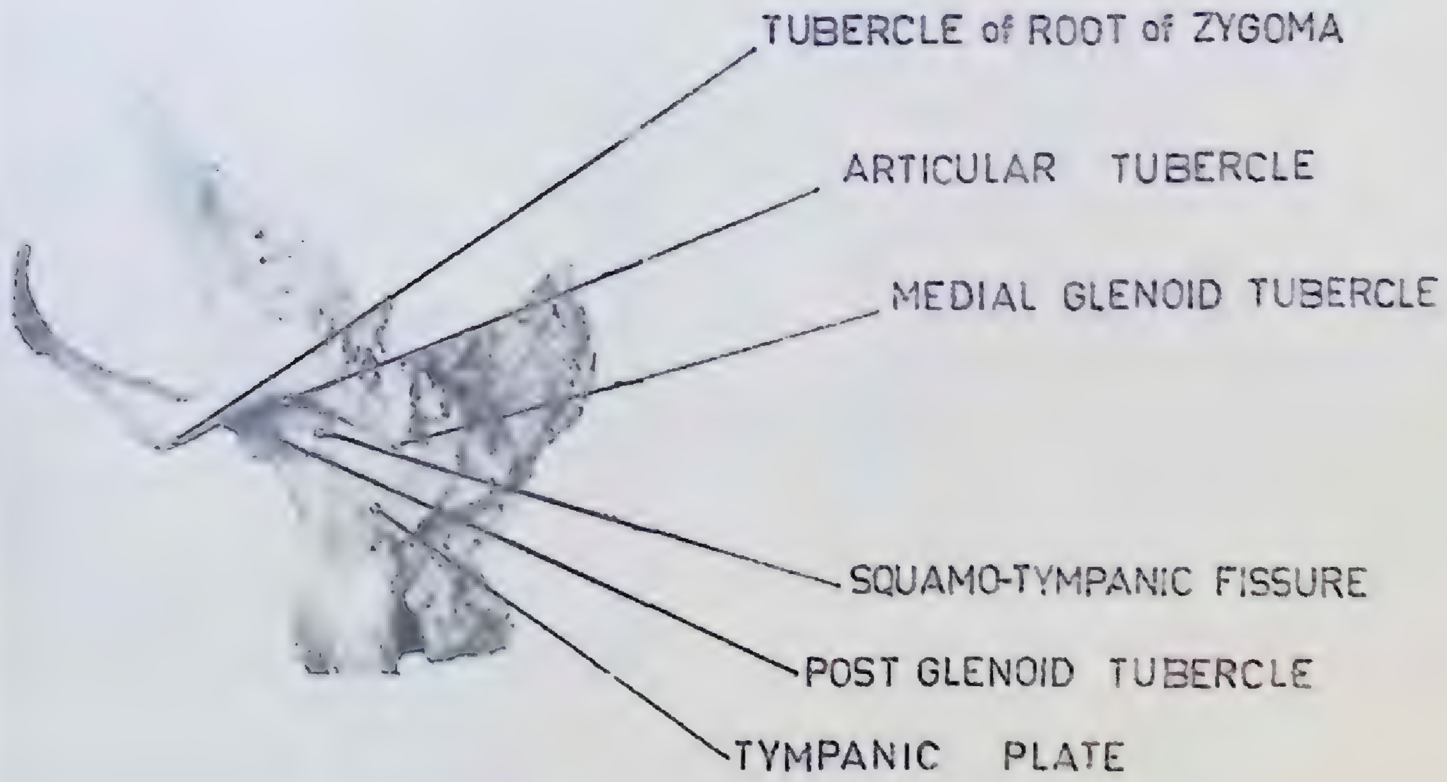

FIGURE 2— *Right glenoid fossa—frontal view*

Since the present study deals only with the articular fossa, further description will be limited to that part. The fossa is roughly pyramidal in shape with a rounded apex (Fig. 6) and a base opening downwards at about the level of the middle of the auditory meatus (Fig. 3). The base is triangular with its apex directed towards the middle cranial fossa (Fig. 5). It has anterior (A), posterior (P), and medial (M) angles, and anterior, posterior, and lateral sides. In order to eliminate the confusion which exists in relevant literature, each boundary will be described in detail.

The anterior angle (A) is the tubercle of the root of the zygoma, located at the point of junction between the anterior and posterior roots of the zygomatic process of the temporal bone (Fig. 1 and 3). This downgrowth from the zygomatic arch usually extends to about the same level as the tip of the post-glenoid process described below (Fig. 2 and 3), and it gives attachment to part of the temporo-mandibular ligament. The tubercle of the root of the zygoma, which actually forms only the lateral end of the articular eminence, has often been confused with the articular tubercle or eminence, particularly in lateral head plate X-rays.

The posterior angle (P) of the base of the articular fossa is the post-glenoid process, which has been described by Sicher (1960) as a cone-shaped prominence formed by a lateral thickening of the posterior articular lip of the articular fossa. It lies immediately in front of the external acoustic meatus (Fig. 1, 3, and 5).

The medial angle (M) is formed by the medial glenoid process, or temporal spine—a small elevation located at the junction between the angular spine of the sphenoid and the tympanic plate of the temporal bones (Fig. 1, 2, 3, and 5).

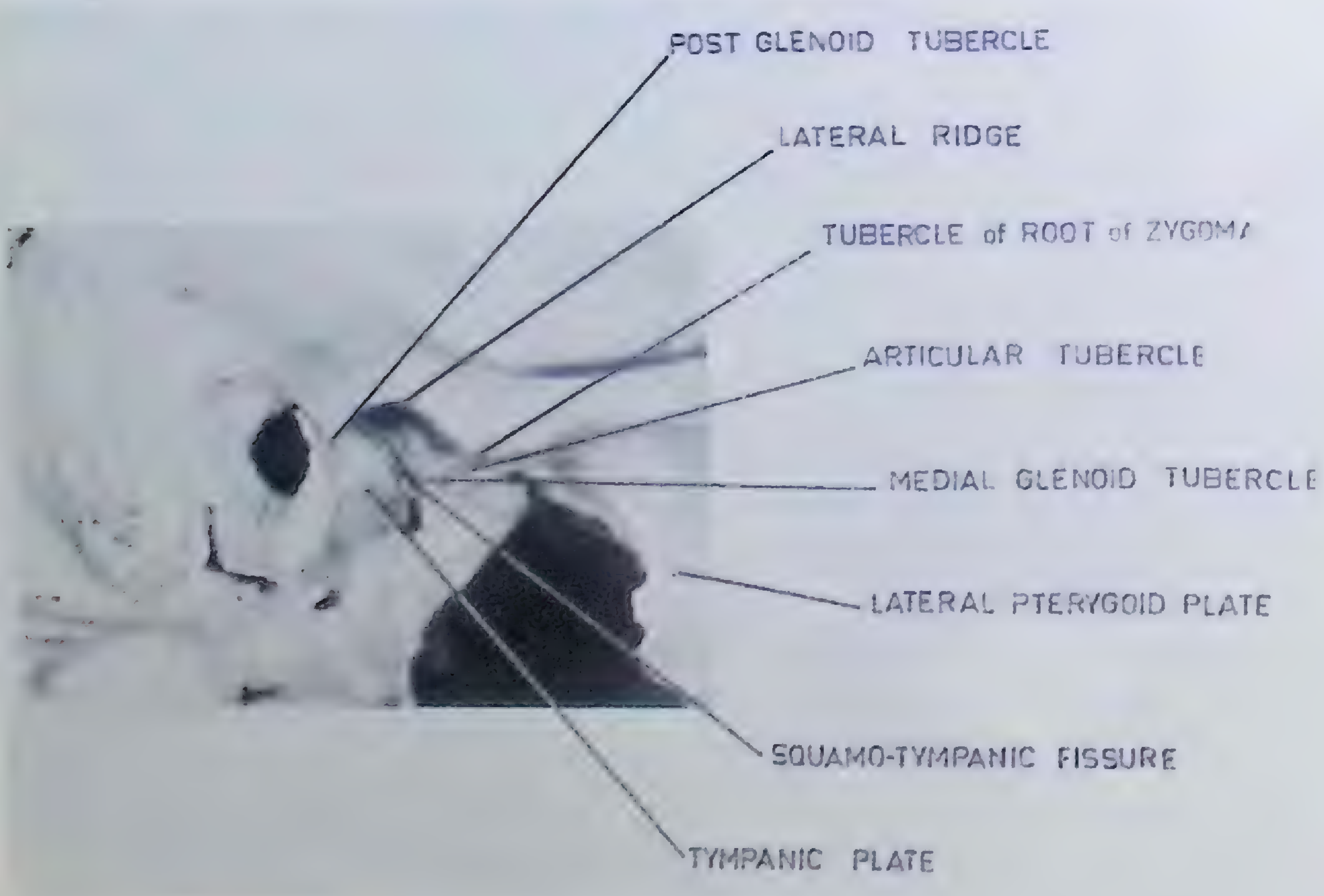

FIGURE 3—*Right glenoid fossa—lateral view*

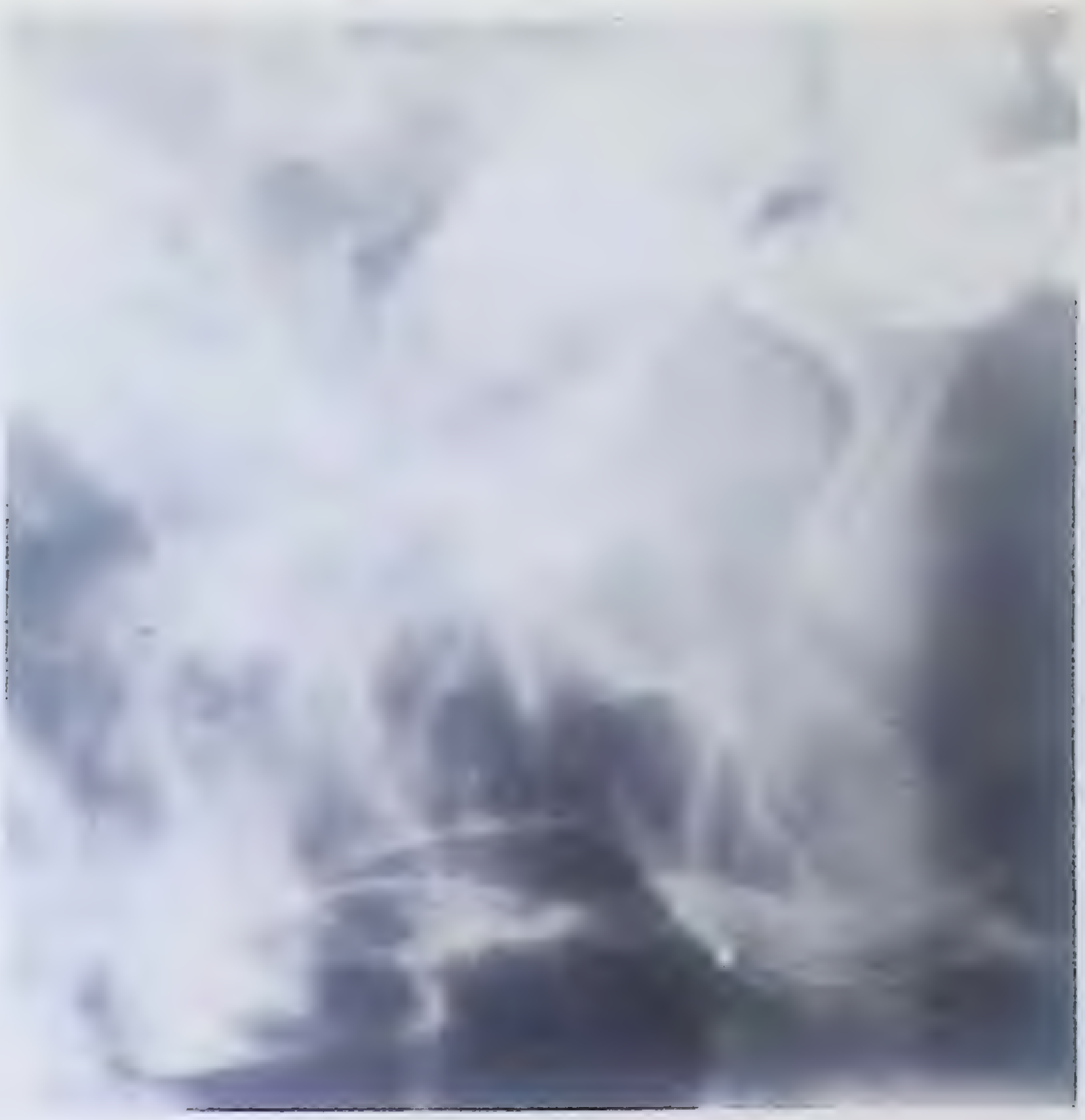

FIGURE 4—*Lateral radiograph showing the temporo-mandibular joint*

The anterior border of the base of the fossa is the articular eminence or tubercle, which forms the anterior root of the zygomatic process. The anterior surface of the tubercle leads into the infra-temporal fossa; its posterior surface forms a slope called either the anterior slope of the articular fossa or the posterior slope of the articular eminence. The eminence is directed latero-medially and slightly antero-posteriorly (Fig. 1 and 8), and it is convex antero-posteriorly and concave medio-laterally (Fig. 2). Its surface is smooth for articulation with the articular disc of the tempero-mandibular joint. The posterior boundary of the articular fossa is the squamo-tympanic fissure (Fig. 1 and 3). This fissure, as such, does not extend across the entire width of the fossa because, through its medial half, the inferior edge of the tympanic roof (*Tegmen tympani*) protrudes between the squama and the tympanic bones to divide the squamo-tympanic fissure into an anterior squamo-petrous and a posterior petro-tympanic fissure (Fig. 3).

Laterally, the boundary of the articular fossa is the lower border of the posterior root of the zygomatic process. This border is often, but not always, elevated to form a narrow bony ridge. It is always concave antero-posteriorly (Fig. 3).

REVIEW OF LITERATURE

Since the end of the last century a number of investigators have studied the shape and size of the glenoid fossa. The earlier writers describe the fossa as a whole, from an anatomical or anthropological point of view, and in general their papers lack measurement data as well as information indicating the sources and amounts of materials they have used.

It was not until the middle of the century that detailed descriptions of the glenoid fossa, including reasonable sample sizes and statistical analyses of data, were published. All investigators have related its shape and dimensions (particularly depth) either to genetic characteristics, sex, age, and growth, or to environment and function.

One of the earliest studies of the glenoid fossa was made by Folli in 1889. He reported that Negroes had a shallower fossa than white people, and that short individuals, in general, had shallower fossa than tall persons. Some authors (Duckworth, 1904; Weidenreich, 1943; Knowles, 1915; Hooton, 1918; Pederson, 1949) related the shallowness of the glenoid fossa to a racial origin. Some others (Hawkes and Wallis, 1916; Pearson and Woo, 1935; Angel, 1944) denied this sole relation between fossa depth and genetic control and race.

Published reports are not in agreement whether the depth of the glenoid fossa is different for males and females. Nevakari (1960), in a roentgenographic study of 200 females and 200 males, found no difference in the depth of the fossa, while Lindblom (1960) found a statistically significant difference between males and females only in the length of the anterior wall of the fossa.

The fossa has been described as rounded and shallow in infancy and childhood (Folli, 1899; Martin, 1928; Weidenreich, 1943). The increase in depth has been observed (Goodfriend, 1934; Costen, 1936; Harris, 1938; Angel, 1944; Nevakari, 1960) in age change and growth.

The depth of the fossa has also been related to function. Sullivan (1917) found a correlation between fossa depth and tooth wear, which is not accepted by Campbell (1925).

The type of bite has been related to fossa depth by Goodfriend, 1934; Breitner, 1941; Harris, 1938; Costen, 1936; and Nevakari, 1960; although Burley (1961) found no correlation between the shape of the fossa and articular eminence and the type of occlusion.

MATERIALS AND METHODS

Skulls were selected for study from the collection in the Physical Anthropology Laboratory of the Department of Anatomy, University of Toronto. For the most part only skulls that had no major developmental abnormalities, no gross evidence of disease such as arthritis, good molar dentition, a complete glenoid fossa, and no broken or lost cranial bones that would interfere with proposed measurements were used. However, the material obtained from the anatomy dissecting room being already divided mid-sagitally could not be used for gross cranial measurements. In addition, a few specimens did have missing parts (e.g., infratemporal spine), and these could not be used for evaluating all the specific structures under study.

Table 1 gives the origins of the sample studied. The dissecting room material represents mainly elderly Caucasoids drawn from the metropolitan Toronto area during the last twenty years. Ten Eskimo crania from the Canadian Central Arctic belong to the Learmonth Collection (Anderson and Merbs, 1962). The Ontario crania form a sample largely drawn from Iroquois of The Boyle Collection (Anderson, 1961) in the Royal Ontario Museum, Iroquois of the Fairty ossuary (Anderson, 1964), and pre-Iroquois of Bosomworth Site (Emerson, 1959; Anderson, 1962). The Manitoba Mound material (Cameron, MS.) was collected by Henry Montgomery in 1907, and the Salish crania are from the Chase Site (Harrison, MS.) in British Columbia. The Asiatic Indian skulls were purchased commercially, and because of the fine quality of their dentition this group was used as a basis for measuring overbite relationships.

TABLE I

SUMMARY OF MATERIAL STUDIED

Origin	Number		Total
	Male	Female	
Dissecting room	25	2	27
Dissecting room (edentulous crania)	24	2	26
Eskimo	8	2	10
North American Indian:			
Salish (British Columbia)	10	0	10
Ontario Iroquois and Pre-Iroquois	64	14	78
Manitoba Mounds	20	7	27
Mexican	4	2	6
Egyptian	4	6	10
Asiatic Indian	24	16	40
Unknown	17	10	27
TOTALS	200	61	261

The sex of a skull was determined on the basis of its size and general structure as a whole, and on the individual bones separately, e.g., the facial skeleton, the mandible, the zygomatic arch, and so on. The size and degree of development of the supra-orbital and temporal ridges, the mastoid processes, the supra-mastoid crests, the teeth, the development of the frontal eminences, and the degree of sharpness of the margins of the orbits were considered in establishing the sex.

All data pertaining to the skulls, such as race and sex, together with all the measurements as outlined below, were recorded on marginal punch cards for analysis (*See* Fig. 9).

Cranial length (L) was measured with the spreading caliper from glabella to the most distal point in the mid-sagittal plane. Cranial breadth (B) was determined as the maximum distance between two points just above the level of the supra-mastoid crests at a right angle to the sagittal plane. Cranial height (H) was the distance from basion to Bregma. Using these three measurements the *module* of the cranium was determined from the formula

$$\frac{(L+B+H).}{3}$$

In order to study the relation of size and shape between the glenoid fossa and the muscle activity, the origins of the masseter muscle on the zygoma and the temporalis muscle on the parietal and frontal bones (the temporal line) were recorded as + or ++ depending on their prominence. The size of the lateral pterygoid plate was estimated and classified into seven divisions according to size (Table V and Appendix A).

The length of the infra-temporal spine (the bony downgrowth from the anterior end of the infra-temporal crest) which is believed to form an attachment either for the temporal fascia or for fibres of the superior division of the lateral pterygoid muscle, was classified into five divisions according to size.

The degree of development of both the lateral part of the articular tubercle and the post-glenoid tubercle was recorded; the former was designated as either normal or large, and the latter as normal, over-, or under-developed. The post glenoid tubercle was considered normal when it was about the same height as the most lateral part of the articular tubercle (tubercle of the root of the zygoma).

The degree of overbite was recorded as zero when the incisors were in an edge-to-edge relation; as slight, when the overbite was two millimetres or less; and as marked, when the overbite was more than two millimetres.

The degree of tooth wear was originally grouped into five main classes (0, 1, 2, 3, or 4) depending on the amount of wear on the molar and premolar teeth:

Class 0 – no trace of wear on cusps.

Class 1 – wear confined to cuspal enamel, the cusps being slightly worn down.

Class 2 – wear reached the dentino-enamel junction.

Class 3 – wear into the substance of the dentine.

Class 4 – wear involved the pulp chamber.

These classes were subdivided into 0+, 1+, 2+, and so on, so that nine groups were finally recorded and used for analysis.

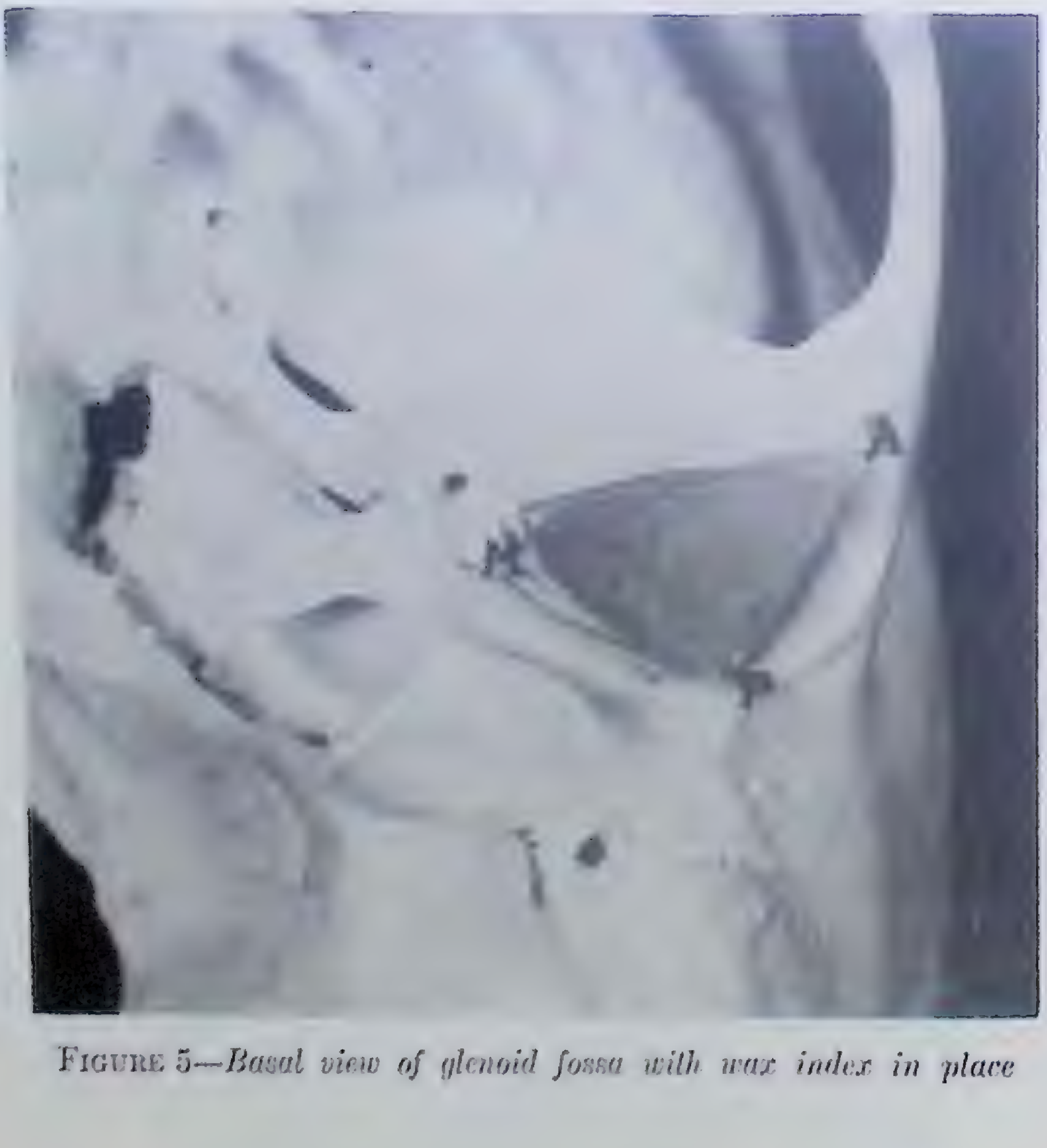

FIGURE 5—*Basal view of glenoid fossa with wax index in place*

FIGURE 6—*Lateral view of wax index showing the method for measuring the depth of the glenoid fossa*

The shape and size of the glenoid fossa were measured according to a wax index, which was made by using anatomical points to form the boundaries of the fossa itself, with no reference to outside base lines such as Frankfort or Camper. Pink wax was softened, pressed into the fossa and levelled with a flat spatula to form a plane through three points—the tip of the post glenoid tubercle (P), the lowest point of the lateral part of the articular tubercle (A), and the tip of the medial glenoid tubercle (M) (Fig. 5). The flat base of this index was roughly parallel to the Camper plane used by Lindblom (1960). The anterior border of the index extended to the anterior margin of the articular eminence. Measurements of this wax index were used to determine fossa depth and the angle of its anterior slope.

With a sliding caliper the depth of the fossa was measured (Fig. 6) as the distance from the flat plane uniting the three reference points to the point of deepest penetration of wax into the fossa. The antero-posterior length was taken as the distance from the tip of the post glenoid process to the apex of the convexity on the articular eminence. Width was measured from the tip of the medial glenoid tubercle to the middle of the lateral border of the fossa (midway between the post glenoid process and the tubercle of the root of the zygoma). The module of the fossa was then calculated as

$$\frac{\text{height}+\text{length}+\text{width}}{3}$$

On 125 skulls (the Asiatic Indians, Caucasian, and some Iroquois) the wax index was cut in two across the plane, passing from the tip of the post glenoid process to the mid-point on the articular tubercle (Fig. 8). The sections were then placed on graph paper and their outlines traced. The angle formed by the line parallel to the anterior slope and the base of the wax was measured as the angle of the anterior slope of the fossa.

A record was made of whether the lateral border of the fossa formed a ridge or a flat facet, or whether the form properly fell between these two types. It was called a ridge when the lateral wall extended downward sharply, and a facet when the surface was rather flat.

Statistical Analysis

The measurements were summarized using means and standard error to provide estimates of racial or group values, and standard deviations to indicate the range and distribution of individual items. The test of average group dimension differences, where standardization of sex was necessary, was carried out by the analysis of variance (Tables III and IV) using the method of weighted differences (Snedecor, 1957). Inter-correlations between the various measurements were investigated by computing linear product moment correlation coefficients and were subsequently combined into first and second degree partial correlation coefficients (Garrett, 1952) (*See* Table II).

The error associated with the measuring technique for fossa depth was computed in terms of the average standard deviation for repeated measurement of the same fossa.

Computations were made of the correlation between each of the three measurements of the glenoid fossa and the other two, and with the module (e.g., length vs. breadth and height). Similarly each skull measurement was correlated with the other two. Each dimension of the fossa was also correlated with each dimension of the skull (*See* Table II).

Because of its functional significance in condylar movement and because the fossa depth was found to be more independent than the other dimensions (Table II), further study of this dimension was made. Depth was compared for bilaterality and analysed for sex and racial differences. In addition, it was tested for correlation with dental wear, with the size of the lateral pterygoid plate, with the degree of overbite, and with the angle of the slope of the anterior eminence.

Further correlations, not necessarily related to fossa or skull size, included the relation between the degree of tooth wear and the size of the lateral pterygoid plate, tooth wear and size of the infra-temporal spine, age and the degree of growth of the articular tubercle, and the shape of the lateral ridge of the fossa and the size of the lateral pterygoid plate.

RESULTS

The average standard deviation for repeated measurements of the depth of the same fossa was 0.09 mm, and thus it was assumed that 95 per cent of the measurements did not differ from their true value by more than 0.18 mm.

The results of the analyses of the data are presented in Tables II to VI. For purposes of convenience the results will be presented under three subject headings: I. Correlations between the Glenoid Fossa and the Skull; II. A More Detailed Study of Fossa Depth; and III. Sundry Anatomical Relations.

TABLE II

CORRELATIONS BETWEEN MEASUREMENTS OF THE GLENOID FOSSA, BETWEEN MEASUREMENTS OF THE SKULL, AND BETWEEN FOSSA AND SKULL

Characteristics

1. Fossa Depth
2. Fossa Length
3. Fossa Breadth
4. Fossa Module
5. Skull Height
6. Skull Breadth
7. Skull Length
8. Skull Module

		Fossa			Skull			
		Length	Breadth	Module	Height	Breadth	Length	Module
Fossa	Depth	r_{12} =+.312** $r_{12.3}$=+.171* $r_{12.4}$=-.289	r_{13} =+.341** $r_{13.2}$=+.223** $r_{13.4}$=-.402	r_{14}=+.589**	r_{15} =+.346** $r_{15.6}$ =+.269** $r_{15.7}$ =+.157* $r_{15.67}$=+.149*	r_{16} =+.314** $r_{16.5}$ =+.225** $r_{16.7}$ =+.170* $r_{16.57}$=+.162*	r_{17} =+.374** $r_{17.5}$ =+.218** $r_{17.6}$ =+.270** $r_{17.56}$=+.153*	r_{18}=+.418**
	Length		r_{23} =+.504** $r_{23.1}$=+.445** $r_{23.4}$=-.508	r_{24}=+.777**	r_{25} =+.422** $r_{25.6}$ =+.323** $r_{25.7}$ =+.203* $r_{25.67}$=+.195*	r_{26} =+.452** $r_{26.5}$ =+.364** $r_{26.7}$ =+.305** $r_{26.57}$=+.301**	r_{27} =+.451** $r_{27.5}$ =+.265** $r_{27.6}$ =+.304** $r_{27.56}$=+.158*	r_{28}=+.595**
	Breadth			r_{34}=+.859**	r_{35} =+.485** $r_{35.6}$ =+.385** $r_{35.7}$ =+.248** $r_{35.67}$=+.246**	r_{36} =+.534** $r_{36.5}$ =+.450** $r_{36.7}$ =+.388** $r_{36.57}$=+.385**	r_{37} =+.511** $r_{37.5}$ =+.305** $r_{37.6}$ =+.349** $r_{37.56}$=+.177*	r_{38}=+.632**
	Mod.				r_{45} =+.540**	r_{46} =+.559**	r_{47} =+.571**	r_{48}=+.644**
Skull	Hgt.					r_{56} =+.332** $r_{56.7}$ =+.063	r_{57} =+.620** $r_{57.6}$ =+.556**	r_{58}=+.734**
	Bth.						r_{67} =+.465** $r_{67.5}$ =+.349**	r_{68}=+.680**
	Lth.							r_{78}=+.810**

* $P < .05 > .01$
**$P < .01$

r_{12} = Primary correlation between characteristics 1 & 2.

$r_{12.3}$ = First degree partial correlation between 1 & 2, for standardized 3,

$$r = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{(1 - r^2_{13})(1 - r^2_{23})}}$$

$r_{12.34}$ = Second order partial correlation between 1 & 2 for standardized 3 & 4.

$$r = \frac{r_{12.3} - (r_{14.3})(r_{24.3})}{\sqrt{(1 - r^2_{14.3})(1 - r^2_{24.3})}}$$

I. Correlations Between the Glenoid Fossa and the Skull

The correlations between the individual measurements of the fossa, between the individual measurements of the skull, and between fossa and skull dimensions are presented in Table II.

The relations between depth, breadth, length, and module of the fossa are shown in the first three columns of this table. The product moment correlation coefficient (r) has been found to be highly significant ($P<.01$) for all six primary correlations; the three dimensions of the fossa are all strongly related to one another, i.e., if one becomes larger, the others become larger too. The correlation is always higher between the individual measurements and the module of the fossa, a result not surprising since each characteristic correlated with it forms part of the module.

When the correlation between any two dimensions was calculated with the third dimension standardized, the results were also statistically significant. Significance was not so statistically great ($P<.05>.01$) for depth vs. length with breadth standardized, as for the other two correlations ($P<.01$).

With fossa module standardized, the expected negative correlations were found between fossa dimensions, that is, in fossae with the same module, if depth increased, width or height decreased. The negative correlation was highest between width and length when module was standardized.

When the skull dimensions were related to one another (Table II, rows 5, 6, 7), a similar high degree of positive correlations was found ($P<.01$). Skull length remained highly correlated to height with breadth standardized, and to breadth with height standardized; however, no correlation was found between height and breadth when length was standardized. The relation between each of the three basic dimensions of the skull and the module was highly significant ($P<.01$).

In 176 skulls of pooled races, the module of the fossa was highly correlated ($r=+.644$) with the module of the skull. To ascertain that this correlation

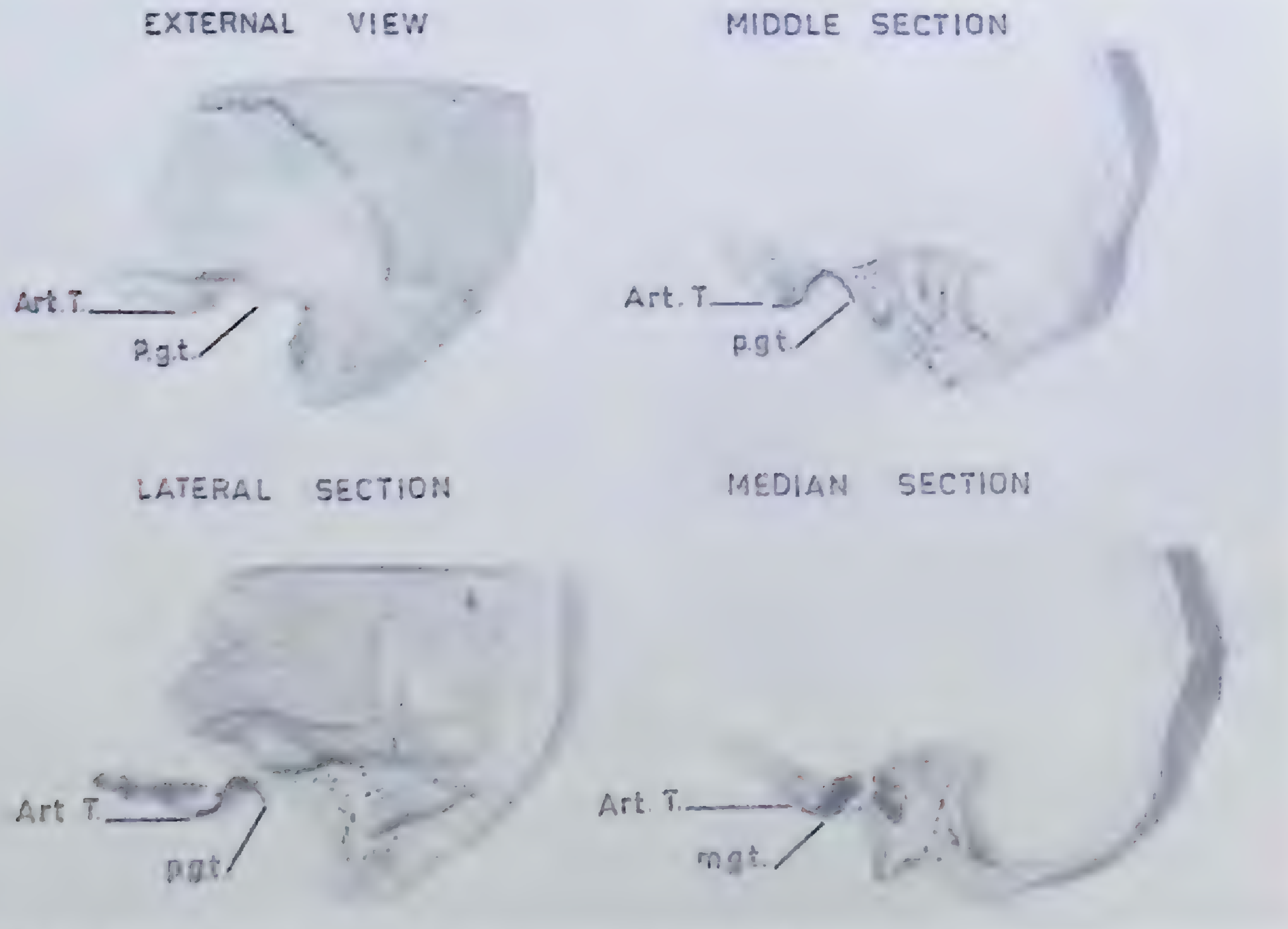

FIGURE 7—*Serial sections through the temporal bone and glenoid fossa to show the increase in depth of the fossa lateromedially*

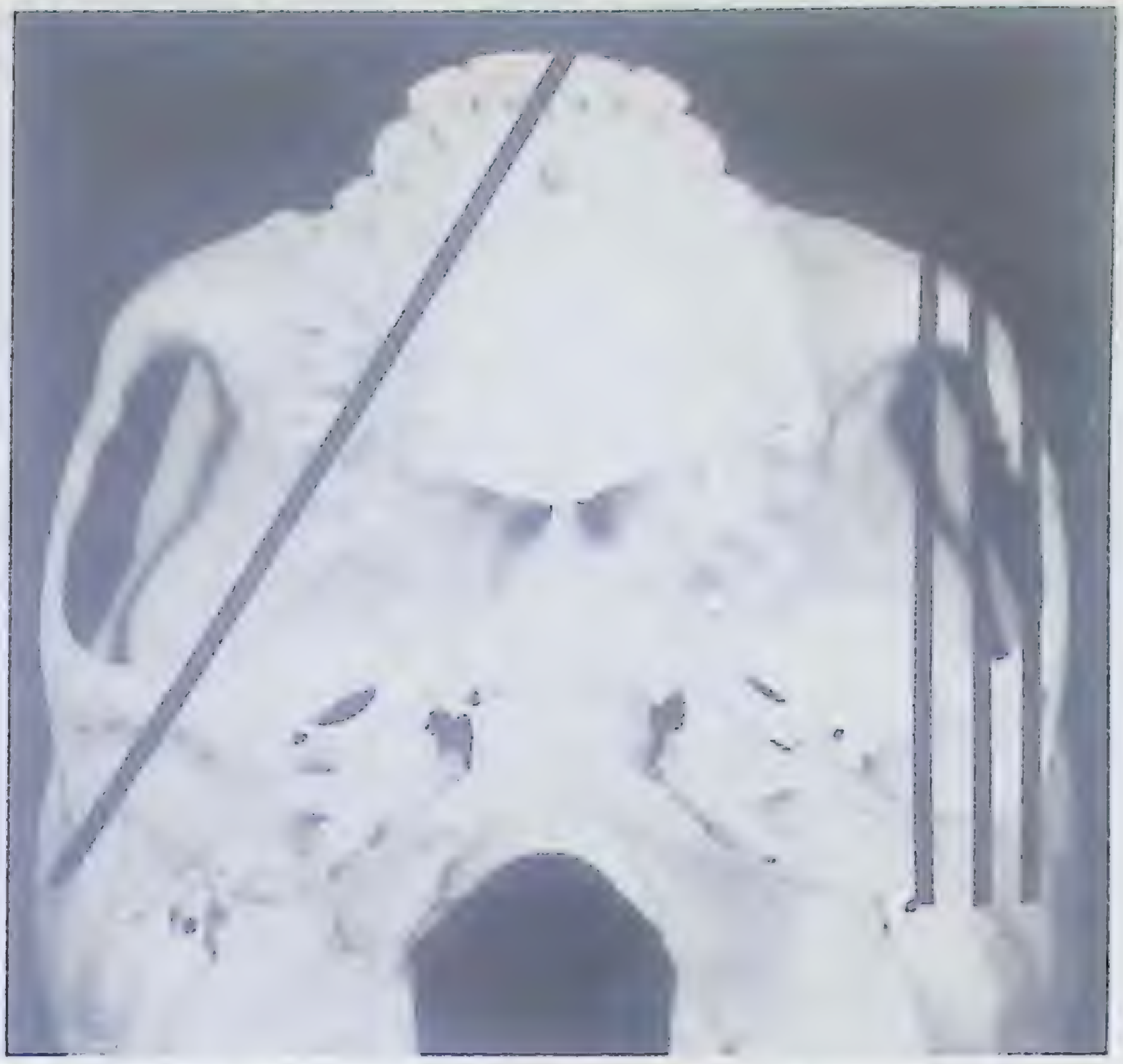

Figure 8—*Basal view of a skull showing both glenoid fossae.*
Lines through the left fossa illustrate the cuts made to form the sections in Figure 7.
The line through the right fossa shows the plane through which the wax index was cut for measuring angle of the anterior slope of the fossa.

was not caused by a difference in mean sizes between races, the same correlation was calculated within races, and the results corresponded. In 40 Asiatic Indian skulls, the correlation coefficient (r) was +.508 ($P<.01$), and for 66 Iroquois Indian skulls it was +.609 ($P<.01$).

When each dimension of the fossa was related to each dimension of the skull separately, using the ordinary bivariate linear correlation, highly significant ($P<.01$) values were found (Table II, columns 4 to 6, rows 1 to 3). In general, the same highly significant values were observed in the first degree partial correlations between each fossa dimension and each skull dimension with one skull dimension standardized; i.e., fossa depth and skull length were highly correlated in all skulls having the same breadth or the same height.

This pattern changed slightly when the second order partial correlations were calculated, i.e., when two of the skull dimensions were standardized, and each of the fossa measurements was compared to the third skull dimension. In this series, the relation between fossa depth and each of the three skull measurements was less significant ($P<.05>.01$). A similar relatively low correlation was found between the length of the fossa and the height and length of the skull, and between fossa breadth and skull length with the other two skull dimensions standardized in each case. All other correlations were highly significant ($P<.01$).

II. A More Detailed Study of Fossa Depth

(*a*) *Right-Left Isomorphism*

Individual right-left differences in glenoid fossa depth were computed on ten Asiatic Indian skulls randomly selected from among the 40 Asiatic Indian skulls. The mean bi-lateral difference was 0.2 mm (SE 2.47) and was not significant. Therefore all subsequent computations were made on measurements of only the left glenoid fossa.

(*b*) *Relation to Sex*

The difference in the depth of the glenoid fossa between males and females was calculated in two instances: when studying racial differences (Table III), and when correlating tooth wear with fossa depth (Table IV). In the first instance the sample comprised the total skull selection (61 female, 200 male), and in the second case 221 skulls (48 female and 173 male) were used.

TABLE III

GLENOID FOSSA DEPTH ARRANGED ACCORDING TO RACE AND SEX

Race	Number of Skulls			Depth of the Glenoid Fossa								
				Female			Male			Total		
	F	M	Total	$\bar{x}$	s^2	$S\bar{x}$	$\bar{x}$	s^2	$S\bar{x}$	$\bar{x}$	s^2	$S\bar{x}$
1. Egyptian	6	44	10	7.2	1.0	±0.40	7.1	1.0	±0.50	7.2	0.9	±0.30
2. Indian (Asia)	16	24	40	7.3	0.4	±0.16	7.5	0.6	±0.15	7.4	0.6	±0.12
3. Mexican	2	4	6	7.1	0	±0	7.8	2.0	±0.70	7.6	1.4	±0.15
4. British Columbia	—	10	10	—	—	—	7.8	0.9	±0.30	7.8	0.9	±0.30
5. Dissecting Room	2	25	27	7.0	0	±0	7.9	1.5	±0.24	7.9	1.4	±0.23
6. Iroquois	14	64	78	7.3	0.4	±0.17	8.0	1.8	±0.17	7.9	1.6	±0.45
7. Manitoba	7	20	27	7.8	2.1	±0.17	8.4	1.5	±0.27	8.2	1.7	±0.25
8. Dissecting Room (old)	2	24	26	7.5	5.0	±1.50	8.4	1.8	±0.27	8.4	2.0	±0.28
9. Eskimo	2	8	10	7.6	2.0	±1.00	9.1	2.0	±0.50	8.8	2.3	±0.47
10. Miscellaneous*	10	17	27	7.5	1.0	±0.32	7.5	9.0	±0.13	7.5	6.0	±0.47
POOLED RACE												
TOTALS	61	240	261	7.4	0.8	± .13	8.0	1.6	±0.09	7.8	1.5	±0.08

Analysis by method of weighted differences of means

There is a highly significant difference in fossa depth by sex. . . . . P < .01

There is a significant difference in fossa depth between races. . . . . P < .05 > .01

Interaction is not significant . . . . P > .05

*Not included in the final computations

In both cases there was a highly significant difference (P<.01) between the fossa depth in male and female skulls. For all skulls the mean depth was 7.8 mm (SE 0.08); for males the depth was 8.0 mm (SE 0.09); for females the depth was 7.4 mm (SE 0.13). Interactions were calculated from the data in both Tables III and IV, and no significance was found (P>.05). In other words, the sex difference in the depths of the fossae was consistently observed regardless of race or degree of dental wear.

(*c*) *Relation to Racial Origin*

The data on glenoid fossa depth and racial origin are presented in Table III. Nine different racial groups and one miscellaneous group are listed in the

Table, although the miscellaneous group was not included in the computations. In the other nine groups, the mean depth and standard error of the fossa were calculated separately for males and females (*See* above), and for the comparison between races the difference in sex distribution was standardized.

For the 234 skulls (51 female, 183 male) on which computations were made, the mean fossa depth ranged from 7.2 mm in Egyptians to 8.8 mm in Eskimos. Using the analysis of variance by the weighted differences of means, the difference in fossa depth between various racial groups was moderately significant statistically ($P < .05 > .01$).

(d) Relation to Tooth Wear

The relation between the degree of wear on molar and bicuspid teeth and glenoid fossa depth is shown in Table IV. A total of 241 (48 female, 193 male) skulls were listed according to the degree of wear on their posterior teeth, and for each group the mean fossa depth and standard error were computed.

Using the analysis of variance by the method of weighted differences of means, no significant correlation was found between the depth of the fossa and the degree of wear of the teeth ($P > .05$).

TABLE IV

GLENOID FOSSA DEPTH ARRANGED ACCORDING TO SEX AND THE DEGREE OF WEAR OF POSTERIOR TEETH

Degree of Wear	Number of Skulls			Depth of the Glenoid Fossa								
				Female			Male			Total		
	F	M	Total	$\bar{x}$	s^2	$S\bar{x}$	$\bar{x}$	s^2	$S\bar{x}$	$\bar{x}$	s^2	$S\bar{x}$
0	6	23	29	7.1	1.4	±0.48	8.0	1.2	±0.22	7.8	1.3	±0.21
1	12	15	27	7.4	0.8	±0.26	8.0	1.3	±0.29	7.7	1.1	±0.20
2	8	26	34	7.5	1.4	±0.42	7.8	0.9	±0.19	7.6	1.0	±0.17
3	4	13	17	7.3	0.3	±0.27	8.1	0.7	±0.23	7.9	0.7	±0.20
4	6	21	27	7.1	0.6	±0.32	8.0	1.2	±0.24	7.8	1.2	±0.21
5	5	31	36	7.6	0.5	±0.32	8.1	1.1	±0.19	8.0	1.0	±0.17
6	2	17	19	6.6	0	0	8.2	1.5	±0.30	8.0	1.5	±0.28
7	5	8	13	7.3	0.5	±0.32	7.9	1.4	±0.42	7.6	1.0	±0.28
8	—	19	19	—	—	—	7.2	1.0	±0.23	7.2	1.0	±0.23
TOTALS	48	173	221	7.2	0.8	±0.13	7.9	1.1	±0.08	7.8	1.1	±0.07

Analysis by method of weighted differences of means
There is a highly significant difference in fossa depth by sex........................$P < 0.1$
There is no significant difference by degrees of wear..............................$P > 0.5$
Interaction is not significant..$P > 0.5$

(e) Relation to Size of the Lateral Pterygoid Plate

A total of 238 skulls were grouped into seven classes according to the estimated size of the lateral pterygoid plate, and the mean fossa depth and standard error were calculated for each group (Table V).

There was no significant correlation between fossa depth and size of the lateral pterygoid plate, although there did seem to be a slight trend toward a positive relation between the two factors.

(f) Relation to Degree of Overbite

No significant correlation was found between glenoid fossa depth and degree of overbite in forty Asiatic Indian skulls (Table VI) which had been identified according to whether they had an edge to edge bite or whether the overbite was less or greater than 2 mm.

(*g*) *Relation to Slope of the Anterior Surface of the Glenoid Fossa*

A positive correlation of relatively low magnitude but of high significance statistically ($r = +.241$) was found between the depth of the glenoid fossa and the angle of the slope of the articular eminence as measured from the wax index.

TABLE V
MEAN DEPTH OF THE GLENOID FOSSA IN SKULLS ARRANGED IN GROUPS ACCORDING TO THE ESTIMATED SIZE OF THE LATERAL PTERYGOID PLATE

Group	Number of Skulls	Mean Fossa Depth (mm)	s^2	$S\bar{x}$
1	38	7.6	1.11	±.17
2	30	7.6	1.27	±.20
3	59	7.8	2.29	±.19
4	37	7.8	1.00	±.16
5	42	8.0	1.44	±.18
6	4	8.8	.60	±.04
7	28	7.9	1.40	±.23

There is apparently a slight but not significant correlation between the fossa depth and the size of the lateral pterygoid plate.

TABLE VI
MEAN DEPTH OF THE GLENOID FOSSA IN SKULLS ARRANGED ACCORDING TO DEGREE OF OVERBITE

Degree of Overbite	Number of Skulls	Mean Fossa Depth (mm)	s^2	$S\bar{x}$
Zero	4	7.2	0.07	±0.13
Slight	25	7.5	0.12	±0.07
Marked	11	7.3	0.8	±0.27

III. Sundry Anatomical Relations

(*a*) *Tooth Wear and the Lateral Pterygoid Plate*

When the degree of wear of the posterior teeth was correlated with the estimated size of the lateral pterygoid plate in 170 skulls, the calculated product moment correlation indicated interdependence between the two features ($r = +.330$).

Since there was possibly a direct relationship between skull size and size of the lateral pterygoid plate, the skulls were grouped into four categories according to the size of the module, and correlation with pterygoid plate size was calculated for each group as follows:

Group	Module	No. of Skulls	Correlation Coefficient(r)
1	13.6 to 14.5	44	+0.281
2	14.6 to 15.1	44	+0.202
3	15.2 to 15.5	39	+0.386
4	15.6 to 16.5	43	+0.137

When skull size was standardized, the correlation between the size of the lateral pterygoid plate and the degree of dental wear was statistically significant ($r = +0.286$).[*]

(*b*) *Length of the Infra-temporal Spine and Degree of Tooth Wear*

In the sample of 113 skulls, the product moment correlation between the degree of dental wear and the length of the infra-temporal spine was statistically highly significant but of relatively low magnitude ($r = +0.225$).

(*c*) *Growth of the Tubercle of the Root of the Zygoma and Age*

The downgrowth of the tubercle of the zygomatic root (the most lateral part of the articular tubercle) was observed in a majority of the edentulous skulls, none of which was less than 58 years old. To find out if an actual relation existed between age and the downgrowth of this bony part, a 2 x 2 contingency table was used.

Calculations were made on a sample of 247 skulls of which 30 were edentulous. The bony downgrowth was observed in 60 per cent of the edentulous skulls, but in only 20.7 per cent of the remainder, and this difference in rates was highly significant ($P < .001$).

(*d*) *Lateral Pterygoid Plate Size and the Lateral Ridge of the Fossa*

An analysis of a 2 x 2 contingency table indicated that the size of the lateral pterygoid plate and the configuration of the lateral ridge of the glenoid fossa were completely independent ($P > .05$).

DISCUSSION

It is recognized that the skulls used in this study were not, strictly speaking, randomly selected. They were chosen on the basis of lack of damage to the skull and on the presence of certain anatomical landmarks. Although it is highly unlikely, there is a possibility that the retention of these landmarks occurred only in specimens with specific morphological characteristics of the particular part of the skull under study.

Much of the lack of agreement about the size and shape of the glenoid fossa in the earlier literature arose because many of the authors used subjective estimations rather than objective measurements in determining fossa size. Either dried skulls or X-rays of living subjects have been used in later studies to relate the deepest point of the glenoid fossa to reference planes such as Frankfort or Camper, and fossa depth generally has been defined as the distance between the deepest part of the fossa and a plane parallel to the reference plane passing through the tip of the lateral part of the articular eminence. Such measurements combine the actual variations in fossa dimensions with variations to angulation of the reference plane.

Angel (1948) used for reference a plane running from the tip of the post glenoid tubercle to the ventral end of the origin of the masseter muscle on the zygomatic arch, parallel to the mid-sagittal plane. Early in the present study it was evident that the deepest point in the glenoid fossa was located medially to the parasagittal plane, and it was found to be on a line passing through the tip of the post glenoid tubercle and the middle of the articular tubercle (Fig. 8). Ricketts (1950) came closer to a true estimate of fossa depth through this plane using laminography, although he arbitrarily selected a plane passing approximately, but not exactly, through the centre of the condyle.

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[*] The direct method was used because of the limited number of categories for wear and pterygoid plate size. The method of partial correlation was of unknown reliability. The average correlation derived by use of a transformation (Snedecor, 1957, p. 382) was +0.286. This is roughly comparable to the average correlation which might have been derived by the partial correlation method.

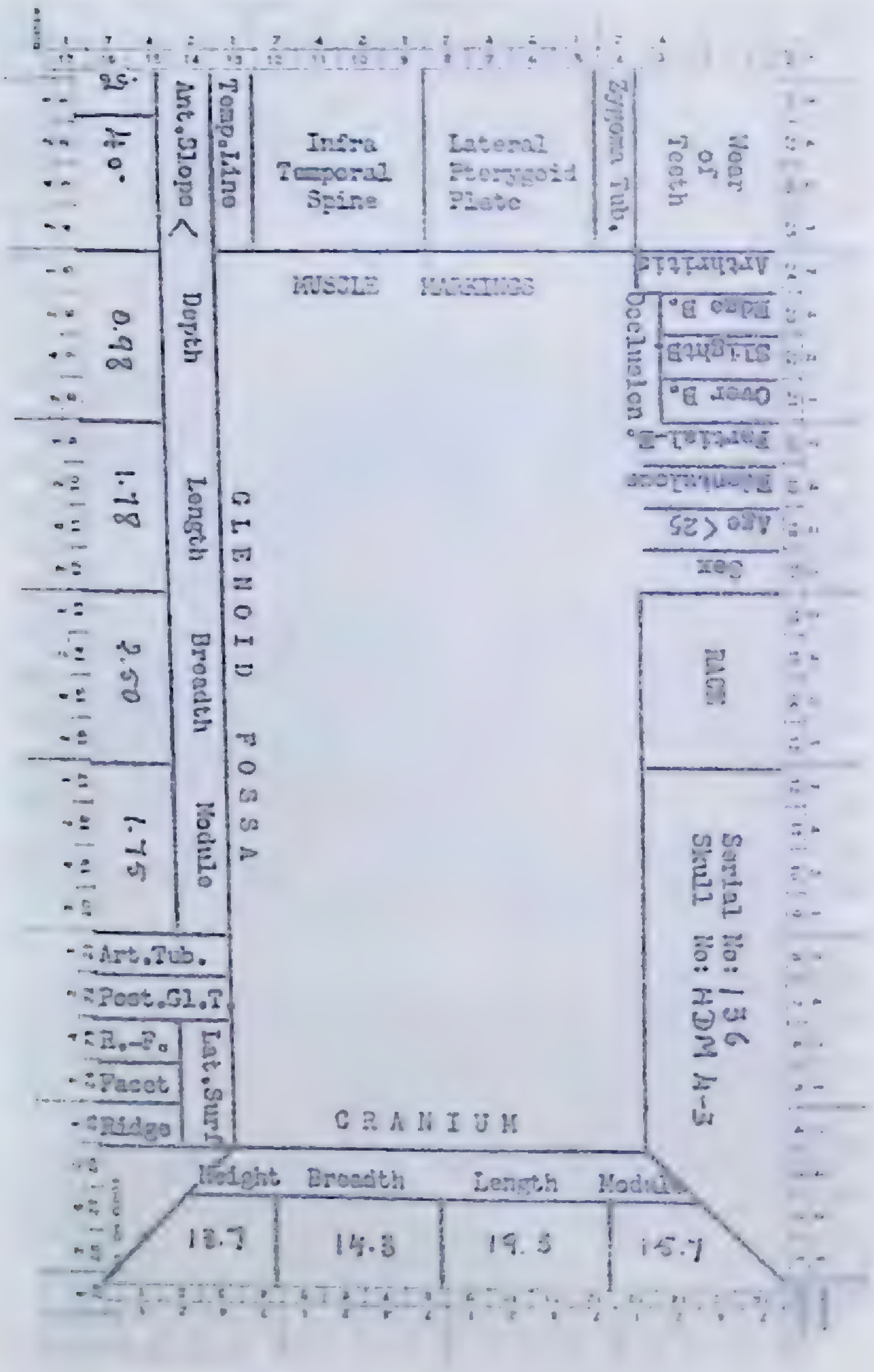
Infra Temporal Spine
Lateral Pterygoid Plate
Zygoma Tub.
Wear of Teeth
Temp.Line
Ant.Slope <
.95
40°
MUSCLE MARKINGS
Depth
0.98
Length
1.78
Breadth
2.50
Module
1.75
GLENOID FOSSA
Arthritis
Edge B.
Slight
Over B.
Occlusion
Age < 25
Sex
RACE
Serial No: 136
Skull No: HDM A-3
Art.Tub.
Post.Gl.T.
Lat.Surf.
Facet
Ridge
CRANIUM
Height
Breadth
Length
Module
13.7
14.3
19.5
15.7

Figure 9—*Photograph of one of the punch cards used to record data*

In the present study, landmarks within the boundaries of the fossa itself have been used to assess its size and shape with no reference to external planes. It was felt that this technique had some advantages, particularly when measuring fossa depth. This method did not only make use of the tubercle of the root of the zygoma as a reference point, as happens in regular X-ray films, but rather utilized a base plane formed by joining relatively constant anatomical points. Variation in any one point, therefore, had little influence on the location of the base plane. In addition, there was no error of angulation or in interpretation of landmarks which sometimes happens when X-ray techniques are used (e.g., the tubercle of the root of the zygoma was not confused with the articular eminence).

The close relation between the three dimensions of the glenoid fossa (depth, length, and width) is not surprising (Table II). However, the length and width were more closely related to one another than was the depth to either of them. With one factor standardized, the correlation between each of the other two measurements remained highly significant, except between depth and length with width standardized ($P<.05>.01$). The expected negative correlation between the fossa dimensions was found when the module was standardized.

It is not surprising that each dimension of the skull was highly correlated with the other two, and with the skull module (Table II). However, it is of interest that when skull length was standardized, no correlation was found between height and breadth. The reason for this lack of correlation is not known, but it may reflect differences in the growth rate of individual skull bones.

The primary correlations between each dimension of the glenoid fossa and each dimension of the skull were all highly significant.

All first-degree partial correlations for skull dimensions with either height or width standardized were also highly significant except when length was standardized. In the latter case the relation between fossa depth and skull height and breadth, and fossa length and skull height, was not so significant ($P<.05>.01$).

The second order partial correlation indicated a relatively greater degree of independence of fossa depth and skull length. The correlation between the depth of the fossa and each of the three dimensions of the skull and between skull length and each of the three dimensions of the fossa (the other two dimensions being standardized in each case) was of relatively low magnitude ($P<.05>.01$). All correlations retained a high degree of statistical significance except the one between fossa length and skull height with the other two skull dimensions standardized, and even here the correlation coefficient was higher than those of the 'low' ones.

These findings were of some interest since they indicated that fossa depth and skull length were relatively more independent than any of the other measurements. The reason for this is not clear. In the skull it would appear that the final attainment of length is under the influence of some factor or factors which do not affect either skull height or breadth to the same degree. Whether this occurs early when the brain is unfolding, or later as the skull continues to develop, remains to be determined.

It is difficult to understand why depth of the glenoid fossa should be more independent than either length or width. Possibly this is related to the method of measuring depth used in this study, where three anatomical landmarks forming the actual fossa boundaries have been chosen to mark the plane from which depth was measured. These may represent ligament attachments (Arstad, 1954), the size of which could be influenced by jaw function. An increase in length of any of the three landmarks is unlikely to alter fossa depth, although over-development of all three could affect it.

Some support for this possibility was found in later observations on the relation between the depth of the fossa and racial origin as discussed below (Table III). According to the method of measuring used in this study, the mean glenoid fossa depth in Eskimo skulls was 8.8 mm, as compared with

7.2 mm in Egyptian skulls. However, for the same groups and using the same wax indices, the height of the tip of the articular eminence above the deepest point in the fossa was greater in the Egyptian skulls (4.2 mm) than in the Eskimo skulls (3.1 mm). This indicates that the greater size of the bony landmarks was probably the reason for greater fossa depth in Eskimos, and that in the same skulls, the articular eminence was considerably more concave laterally.

Contrary to previous reports, in this study there was found a difference in the depth of the glenoid fossa between males and females (Tables III and IV). Nevakari (1960) studied a relatively large sample using the pantomography, and he based his finding of no sex difference on a statistical analysis of his results. However, he has indicated a possible error of from 1 to 3 mm in measurement of fossa depth using the pantomographic technique, and he pointed out that "the depth of the fossa cannot be reliably determined by means of pantomography, any more than by other X-ray methods." He cautioned that when using this technique one should try to avoid evaluating fossa depth between males and females.

Within the inherent error in sex determination from dried skulls it seems quite certain from results reported herein that male glenoid fossae are, on the average, about 0.5 mm deeper than those in females, and that this difference is highly significant statistically. The difference was found in skulls of known sex from the dissecting rooms (Table III), although there were only four female skulls in this collection. Since males in general have larger bony prominences (and this is how skull sex was determined), the three points from which fossa depth was measured would be larger in male skulls, which could account for finding a sex difference. It would be useful to do a further study of this factor using a larger sample of dissecting room specimens where sex could be determined for certain.

In confirmation of many of the earlier studies, a statistically significant difference in mean depth of the fossa was found in skulls of different racial origin (Table III). That the mean fossa depth in the Eskimo skulls was greater than in any of the other nine groups is of particular interest. This is not in agreement with Knowles (1915) and Pederson (1949) who reported shallow fossae in Eskimo skulls. However, one should use caution in concluding from the present data that Eskimos have deeper glenoid fossae than do other races, since only ten Eskimo skulls were studied. In addition, the depth of the fossa in the two female Eskimo skulls was less than that of the Manitoba Plains Indians; the eight male Eskimos had considerably deeper glenoid fossae than any of the other male groups. There is thus support for the observations of Hawkes and Wallace (1916), Sullivan (1917), and Hooton (1918) that considerable variation in depth of fossa occurs even among Eskimos.

The relatively great depth of fossa in the Eskimos reported in this study may be due to differences in genetic constitution in the individuals, or as mentioned above, it may be because they had larger bony prominences (post glenoid tubercle, and so on) from which the measurements of fossa depth were made. Campbell (1925) pointed out that the size of the articular disc may have an influence on the depth of the fossa. This factor was not studied in the present investigation.

Attempts to relate the depth of the glenoid fossa to the degree of the wear of teeth or to the size of the lateral pterygoid plate have not been particularly successful. That the lateral pterygoid plate gives rise to the origin of the lateral pterygoid muscle, which is active during mandibular function, should explain the positive correlation between plate size and dental wear. The correlation between the length of the infra-temporal spine and dental wear may be explained in the same way. However, while there was apparently a very slight but insignificant trend toward a positive correlation between fossa depth and the size of the lateral pterygoid plate, there was no correlation between fossa depth and the degree of tooth wear; the latter observation is in disagreement with Knowles (1915), Sullivan (1917), and Angel (1944). Indeed, since fossa depth was also unrelated to overbite (Table VI) there appeared to be little to support the idea that depth as measured here was determined by dental function at all. It may be that the distance from the deepest point in the fossa to the depth of the concavity of the articular eminence may be related to tooth wear, although no real attempt to measure this factor was made in this study.

One factor which does seem to contribute to the apparent depth of the fossa is the downgrowth of the most lateral part of the articular tubercle (tubercle of the zygomatic root), which, particularly in lateral X-rays, would make the fossa appear deeper. The size of this bony downgrowth seems highly related to age. In this study the edentulous dissecting room specimens were all 58 years old or more, and in them the mean fossa depth was 8.4 mm, which was next highest after the Eskimo (8.8 mm). In addition, a prominent downgrowth of the tubercle of the zygomatic root was recorded in 60 per cent of the edentulous specimens and in only 20.7 per cent of the remainder. These findings agree with those of Angel (1944) who stated that the growth in depth of the fossa in later childhood is caused primarily by the downgrowth of the tubercle.

It is quite possible that the downgrowths of the tubercle of the zygomatic root and the tubercle of the infra-temporal spine are normal manifestations of age and, therefore, that as much as growth of the former contributes to an increase in the depth of the fossa, the growth of the latter is to be expected in older age groups. Further investigations with samples of known age would tend to clarify this point.

It seems that if one is to really understand the morphology of the glenoid fossa, and ultimately the function of the temporo-mandibular joint, one must first learn how to relate clinical radiology with the methods used to study dried skulls. The results of these methods indicate that there is little relationship between the basic anatomy of the fossa and its radiological appearance.

Even on dried skulls a clear and universally adopted definition of fossa depth has yet to be adopted. Whether the technique employed here of using anatomical components of the fossa itself, or whether using planes of reference outside the fossa altogether, is more useful has yet to be determined. Since neither is ideal, perhaps one should take a further look at depth measured from the deepest point in the fossa to the depth of the concavity on the articular eminence. Indeed this may prove to be a more realistic 'functional' depth than any other.

Radiographically, it would appear that more studies using laminography to evaluate the height of the articular tubercle at various distances from its lateral border may prove very useful.

Finally, it would also be helpful to find out what relationships exist between the height of the articular eminence and the tubercle of the root of the zygoma, which has been used as a landmark so extensively in previous studies of the fossa.

SUMMARY AND CONCLUSIONS

A study has been made of the glenoid fossa in 261 skulls (200 male and 61 female) from nine different racial origins. Measurements of the fossa were made from a wax index, for which the high points of the boundaries of the fossa were used to establish a reference plane. From the measurements, appropriate statistical analyses were made to establish a degree of correlation between measurements of the fossa and those of the skull and of certain bony landmarks associated with masticatory function.

It was found that the depth of the glenoid fossa and the length of the skull were more independent than any of the other measurements.

There was no significant difference between the depth of the glenoid fossa on the right and left sides.

There was a highly significant difference in fossa depth between sexes, the depth being greater in males.

There was a significant difference in fossa depth between races. The dimension was greatest for a group of ten Eskimo skulls.

There was no significant correlation between fossa depth and the degree of dental wear, nor between fossa depth and the size of the lateral pterygoid plate, or of the degree of overbite.

A highly significant positive correlation was found between the angle of the anterior slope of the glenoid fossa and fossa depth.

The sizes of both the lateral pterygoid plate and the infra-temporal spine were positively related to the degree of tooth wear.

A highly significant correlation was found between fossa depth, the degree of downgrowth of the tubercle of the root of the zygoma, and age.

There was no significant correlation between the size of the lateral pterygoid plate and the degree of elevation of the lateral ridge of the glenoid fossa.

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THE BERRY SITE

By James F. Pendergast

RÉSUMÉ

L'emplacement de Berry, situé dans le sud de Québec, est actuellement unique en ce que les poteries qui ont été recueilles consistent en grande partie de tessons de bord, sans col ou avec col, ornés d'impressions, mais sans motifs de chevron, et souvent à bords ornementés. Ces diverses variétés de poteries se rencontrent aussi dans les sites iroquois d'Hochelaga, Roebuck, Salem, Grays Creek et Beckstead, mais elles y constituent une plus faible proportion des tessons de bord. L'auteur prétend que cette poterie provient du stade Onondaga-Oneida inférieur et qu'elle se retrouve, mais de moins en moins abondante, à travers la période des temps historiques dans la vallée du fleuve Saint-Laurent. Elle constitue donc un repère chronologique précieux qui permet de situer l'emplacement de Berry dans le stade Onondaga-Oneida inférieur. Cette allégation repose sur une étude comparée de la fréquence des poteries à bords décorés, à crénelures, à épaulements carénés, et des tessons de panse estampés en damier recueillis à l'emplacement de Berry avec celle de poteries de mêmes caractères provenant de six autres emplacements iroquois de la région. L'étude comparée de la fréquence des disques en pierre ou en poterie, des perles en os d'oiseaux, des phalanges adaptées au jeu de bilboquet et des phalanges taillées en forme de barrette trouvés à l'emplacement de Berry avec celle de cinq autres emplacements iroquois de la région semble confirmer la conclusion à laquelle l'auteur est arrivée d'après l'analyse des poteries. Cependant, faute de preuves démontrant que les poteries à col bas ou sans col ornées d'impressions sont essentiellement d'origine iroquoise, l'auteur ajoute qu'il se peut que de telles poteries ne soient pas d'origine iroquoise, mais sans appuyer cette hypothèse. En cette occurrence, leur présence dans les emplacements Onondaga-Oneida qui se trouvent dans l'Est de l'Ontario pourrait signifier qu'il y a eu occupation de ces emplacements par des Iroquois ainsi que par d'autres Indiens auxquels tiendraient les diverses variétés de poteries découvertes à ces emplacements.

SUMMARY

The Berry site in southern Quebec is at present unique in so far as the pottery sample consists largely of stamp-decorated, collarless and low-collared rim sherds. This pottery is not decorated with a chevron motif, and frequently the lips are decorated. These same varieties of pottery have been noted on the Iroquois Hochelaga, Roebuck, Salem, Grays Creek, and Beckstead sites, but there they represent a smaller portion of the rim sherd sample. It is suggested that this pottery is an early Onondaga-Oneida trait which persists in decreasing quantities through to historic times in the St. Lawrence River Valley. As such it is a valuable time marker, and on this basis the Berry site is assessed as being early Onondaga-Oneida. This claim is supported by a comparison of the incidence of pottery with decorated lips, castellations, carinated shoulders, and check-stamped body sherds on the Berry site, compared with the same traits on five other Iroquois sites in the general area. A comparison of the incidence of stone discs, pottery discs, bird-bone beads, cup-and-pin phalanges, and toggle phalanges on the Berry site compared to five other Iroquois sites in the area appears to confirm the conclusion reached on the basis of the pottery analysis. However, lacking the evidence to prove that stamp-decorated, low collared and collarless pottery is in fact Iroquois, the author mentions, but does not support, the possibility that such pottery is non-Iroquois. If such is the case its appearance on Onondaga-Oneida sites in Eastern Ontario may reflect the co-occupation of these sites by Iroquois and non-Iroquois: the latter being responsible for those varieties of pottery on the site.

INTRODUCTION

During 1961 and 1962 a detailed study of three Iroquois sites in Eastern Ontario (Pendergast, 1965, in press) brought to light the fact that there existed on Iroquois sites in that area a significant group of pottery which had not been noted by MacNeish in his study of Iroquois pottery types (MacNeish, 1952). The salient characteristics of these vessels are the variety of low-collared, thickened lips, and of collarless rim shapes involved and the use of numerous motifs executed in a number of linear stamping techniques.

Correspondence with Mr. P. Schuyler Miller in 1962 revealed that he had noted the existence of similar sherds in some quantity during his study of Iroquois pottery from Vermont. As a result, speculation arose as to the possibility of there being similar sites in the archaeologically unknown intervening area of Quebec between the Richelieu and St. Lawrence rivers north of the Adirondack Mountains. That possibility led me to propose to the National Museum of Canada that an archaeological survey be made of the area. The suggestion was accepted, and a survey was made during August 1963 by a party led by the author.

One of the sites located was the Berry site. A subsequent search of archaeological literature and local histories as well as discussions with local farmers, appears to indicate that the site was until then unknown.

THE SITE

The Berry site, BgFo3 in the National Museum of Canada catalogue of sites, is located on the south half of Lot 51, Concession 2, of the Township of Godmanchester in the County of Huntingdon in the Province of Quebec. More specifically, it is located at map reference 500902 on the Canada map series, scale 1:50,000, Huntingdon Sheet 31 G/1, west half.

It lies along the top and north slope of a sand-blow and scantily covers an area approximately 125 yards by 70 yards. The sand-blow itself is approximately 300 yards long and 200 yards wide on the north and west sides of a low hill which rises about 250 feet above sea-level, and 25 to 50 feet above the surrounding terrain.

To the west of the site there is a low area now only wet in the spring of the year; it probably represents the remains of a small tributary of the west branch of the Rivière La Guerre, which is a small river flowing into the St. Lawrence (Lake St. Francis) at a point some 4½ miles north of the site.

Local residents recall that about twenty-five years ago a large sand dune covered the site. Since that time the sand has blown into the woods to the east and northeast of the site.

Potsherds were found on much of the surface of the site and particularly along the east and north sides where the remains of an old sod line, now under as much as eighteen inches of blow-sand overburden, is exposed. As was the case at Crystal Rock (Pendergast, 1962), much of this overburden consists of sterile, dark, charcoal-stained sand. This feature is again assessed as being a mixture of charcoal and sand, blown from other areas of the site which have been destroyed by wind erosion. It was below this overburden that an intact midden and a few pits were located and excavated.

EXCAVATIONS

During the summer of 1963, at the time the site was found, a surface collection was made and a test trench was dug consisting of four five-foot squares. Before the surface collection was made, the site was divided into quarters, and the artifacts recovered were kept separated on this basis in the event that horizontal components were involved. Subsequent analysis, however, strongly suggests that a single component is represented.

In October 1964, when the significance of the site was more fully appreciated, further excavations were carried out in an effort to obtain a sample sufficiently large to analyse as the basis for a report. At that time the midden partially excavated by the test trench in 1963 was fully excavated, and four pits were located and excavated. Pit 1 was found as a result of a concentration of pottery on the surface that had been exposed by the wind since the 1963 survey. Pit 2 was located as a result of systematically test-pitting the area. Pits 3 and 4, both small and probably associated with post moulds, were found below the midden Area 1 when it was excavated.

Excavation was done using trowels after the windblown overburden was removed. Artifacts from the various features were kept separate, and the locations involved are indicated in the paper to permit the reader to assess for himself the validity of the claim that horizontal components are not involved. The presence of rim sherds from the same pot at various levels of the pits, and on one occasion in the shallow midden, supports the contention that vertical components are not present.

The depth of the middens in Areas 1 and 2 varied considerably. At the edge of the blown areas the middens tapered to a thin wedge under a few inches of blow-sand overburden. In locations where they were under a foot or more of overburden they varied from eight to fourteen inches in depth. Pit 1 was approximately five feet in diameter, generally bowl-shaped, three feet deep, and filled with charcoal-stained sand containing many large and small fire-cracked and spalled stones in no apparent pattern. A considerable amount of pottery was recovered from this pit. Pit 2 was three feet in diameter, generally conical in shape, two feet deep and was filled with a mixture of dense charcoal and grey ash containing numerous small potsherds, many of which were burned. Most of the artifacts recovered came from these two pits. Pits 3 and 4 were approximately eighteen inches in diameter, cylindrical in shape, two feet deep, and were filled with charcoal-stained sand and grey ash, containing a few potsherds.

A number of post moulds were uncovered, but no pattern was discernible because of the relatively small area excavated and the fact that much of the site has been eroded to a level below that at which the post moulds occur. It is possible that with the use of mechanical equipment the site could be graded so as to disclose house patterns and possibly additional middens and pits.

Groups of fire-cracked and spalled rock and clusters of pebbles occurred on the otherwise clean sand where the site is blown out. These may represent the remains of fireplaces, but they have been so eroded by blown sand that it is difficult to determine their original purpose.

ARTIFACTS

The inventory of artifacts recovered is small. The erosion of the site by the wind is undoubtedly responsible to a degree, but it is also likely that it was originally a small site. This conclusion is supported by the author's experience with a number of small sites in Eastern Ontario and southern Quebec that produce a small amount of pottery from the surface of sandblows, which is akin to that from the Berry site.

The artifacts from the surface of the northeast quarter of the site on which historic items abound are not connected with the historic items, because similar artifacts also occur in adjacent undisturbed areas below the historic items on the surface.

POTTERY

By far the largest part of the sample from the Berry site is pottery. This consisted of 84 rim sherds, 25 collar sherds, 164 neck sherds, 39 shoulder sherds, 780 body sherds, 4 fragments from small (children's?) pots, and the remaining 3 sherds of the sample cannot be recognized as being from any particular portion of a vessel.

The rim shapes, decorative motifs, and decorative techniques are illustrated in Figures 1 and 2. Table 1 correlates these attributes and indicates the areas of the site from whence the sherds came. The random occurrence of all pottery types over the whole of the occupied area indicates that horizontal components are not involved.

There are instances where the motif is generally that associated with one or another of MacNeish's pottery types; e.g., Durfee Underlined; but the rim shape and/or technique differs sufficiently from MacNeish's definition to prohibit their being equated. Because so little is known of sites of this nature, it is considered premature to suggest new pottery types, and, for the time being, description alone is believed more appropriate.

A number of low-collared and collarless rim sherds which have been decorated by use of a linear stamping technique resemble those recovered from the Salem, Grays Creek, and Beckstead sites (Pendergast, 1965, in press). However, the addition of the Berry site sherds still does not add sufficient data to this group of rim sherds from Eastern Ontario to warrant suggesting new Iroquois pottery types. Rather, the number of shapes and motifs is proliferated, making definition even more difficult. The attribute reinforced by the Berry site sample is the prevalence of a linear stamping technique.

Parenthetically, it should be explained at this point that the term *linear stamping* is used in this paper to describe a technique involving the impression of the wet clay with the end or side of an object, probably a paddle. The resulting impressions may be ovoid or rectangular in shape and may vary from being nearly round or square to being elongated to the extent that only on close examination can they be differentiated from an incised line. Short stamps may be laid end-to-end to create a linear effect, or a single long stamping may be used to create the intended linear motif. The latter is more common than the former. Because stamps are not dragged from one impression to the next, they do not resemble the push-pull technique. Instances occur where the paddle has been notched, leaving a dentate stamp impression. Wright favours the term *punctate* to describe the former technique. The author favours the term *linear stamping* both to provide a continuity of terms used to describe similar techniques in the paper on the Salem, Grays Creek, and Beckstead sites (Pendergast, 1965, in press) and to differentiate from the various ovoid-shaped punctate impressions frequently found spaced around the shoulders of later Iroquois vessels from such sites as Roebuck.

Twenty-five collar sherds are so fragmentary as to make analysis difficult. However, the shapes of those sufficiently large to determine significant characteristics are illustrated in Figure 2. Correlated in Figure 3 are the motifs associated with these shapes together with an indication of the area of the site from which they were recovered.

Generally speaking, the rim sherds with high or medium height collars have lips which slope inwards, and those with low-collared and collarless rims, including those with rolled and expanded lips, slope outwards.

Sixty-two rim sherds, 73.8 per cent of the rim sherd sample, have decorated lips. The motif and technique used are shown in Figure 3 on the line 'B.'

One hundred and sixty-four portions of the necks of vessels are included in the sample. Eighty-eight of these are not attached to portions of the collar or shoulder, and all except one are undecorated. The exception is one sherd which shows signs of deep horizontal wiping. Fifty-four portions of the neck of the vessels are attached to sherds with collars; forty-nine are undecorated. In the decorated group two have horizontal incised (trailed?) lines immediately below the collar; one has a single horizontal row of punctate dots below the collar; one has two horizontal rows of punctate dots below the rolled lip; and one has a plait of long oblique lines on the neck of a crude collarless pot. Of the twenty-two portions of necks attached to shoulder sherds, twenty are undecorated; the remaining two have a single row of oblique incised (trailed?) lines above the shoulder.

Neck sherds vary in shape from being sharply flared; e.g., Figure 2, Rim Fragment 'L,' to practically vertical; e.g., Figure 2, Medium Height Collar 'K.'

Thirty-nine shoulder sherds are included in the sample. Twenty-six of these are undecorated. The decorations found on the remainder are illustrated in Figure 3. The range of shoulder shapes in the sample is illustrated in Figure 2. Not more than eleven approach the degree of carination found at Roebuck or Salem.

From the surface and by excavation 780 body sherds were recovered. There is, in addition, a considerable number of split and eroded body sherds which were too fragmentary to be used for analysis. Of the total number of body sherds, 504 (64.6 per cent) are plain; 270 (34.6 per cent) are check-stamp decorated; 5 (.6 per cent) are scarified; and one (.1 per cent) is marked with a ribbed paddle. In colour they range from red-brown through brown to black. A few sherds from what appears to be a single pot found on the surface are bright orange in colour. The general impression of colour conveyed by the whole of the excavated sample is brown-black. Some sherds are mottled with a wide range of the colours mentioned, and some are mottled opalescent, probably due to mould. The convolutions in the paste of a few sherds, particularly those without temper, appear to indicate that the paste used had the consistency of dough, with the result that the paste did not fuse into a homogenous mass. The fact that many of the sherds are bumpy and cracked in a crazed pattern, particularly around the large pieces of temper which appear on the interior and exterior surfaces, suggests that the technique of manufacture was not so far advanced as was the case at Roebuck or Salem. The presence of a small number of sherds with no temper also suggests a poorer technique. The random manner in which the sherds have fragmented indicates that the vessels were made using the paddle-and-anvil technique rather than the coil method. Many body sherds when viewed in cross-section have a black layer of unoxidized clay between two lighter layers, usually brown or orange, of oxidized clay. This suggests a short firing time or low firing temperatures. The few orange-coloured sherds found on the surface are the same colour throughout, indicating high-firing temperatures.

Four fragments of pottery with no temper appear to be the remains of children's pots. They are little more than irregular depressions in crude balls of clay from 1 to 1½ inches in diameter. One item has been decorated with a single line of small punctate dots below the lip on the exterior surface.

Three sherds are bluntly keel-shaped in cross-section. Two are decorated with opposed lines executed in a dentate stamp technique. The other is decorated with opposed incised (trailed?) lines which incorporate the ladder plait decoration on one side of the ridge. Although it cannot be stated with certainty, they may be from the shoulders of carinated vessels.

PIPES

Only five fragments of pipes were recovered. Four are bowl fragments, two of which are sufficiently intact to indicate the characteristics of the pipe involved, Plate I, figs. 1 and 2. A fragment from the base of a bowl with a portion of the stem attached indicates that the stem joined the bowl at a right angle.

BONE ARTIFACTS

The total sample of bone of any kind from the site amounts to twenty-seven small fragments, twenty of which were found in Pit 2. Of this small sample only three bird bones show signs of having been scored and broken. It is suggested that they are discards from a bird-bone bead industry.

STONE ARTIFACTS

The stone inventory is also very small. The most elaborate stone item is a small soapstone maskette recovered from the surface on the northeast quarter of the site (Plate I, fig. 3). The only other stone artifacts are an oval-shaped polished black pebble approximately one inch long and three-quarters of an inch in diameter, and a piece of worked quartzite (Plate I, fig. 4). Nine black flint chips and three quartzite chips recovered during excavation complete the inventory.

FOOD DEBRIS

Only twenty-four fragments of bone likely to be food refuse were located. Most of these had either been burned or cooked; this may have been a factor in their preservation. All are from small animals or birds. Three fragments of freshwater clams were found in Trench 1 Square 2 as were three carbonized kernels of corn. A layer of dense black carbonized material in Pit 2, probably human feces, contained a number of small round yellow seeds approximately one millimetre in diameter. Their presence suggests food gathering as a source of subsistence. They have tentatively been identified as black raspberry by Dr. A. E. Porsild, Chief of Botany Division, National Museum of Canada.

Soil samples were taken from the pits and midden area to determine whether the acidity of the soil was responsible for the paucity of bone recovered. The pH of two samples from Pit 1 were 5.50 and 5.54; the sample from Pit 2 was 6.02; and the sample from the midden Area 1 was 5.70. As such, they have a pH in the range of standing rain water, slightly acid. The lack of bone can therefore hardly be attributed to the present acidity of the soil, but its present state is not necessarily indicative of what it may have been in the past.

Sufficient charcoal was collected to provide a sample for Carbon 14 dating, and it has been suggested that it be included in the National Museum of Canada's dating program.

DISCUSSION

The Berry site is enigmatic in so far as it may be either

a. An Iroquois site early in the development of the Iroquois of the St. Lawrence River valley, or,

b. A non-Iroquois site coeval with such Iroquois sites as Salem, Grays Creek, or Roebuck.

The case in favour of the first possibility is premised upon the abundance of stamped collarless and low-collared rim sherds which are considered to represent an early stage in Onondaga-Oneida Iroquois development before medium height and high incised collars came into vogue. Such a view is supported by Wintemberg's suggestion that collarless everted rims, his Third Type at Roebuck, are "a survival of an earlier stage in Iroquois development" (Wintemberg, 1936, p. 36, 123). This possibility is also considered to apply to Salem, Grays Creek, and Beckstead (Pendergast, 1965, in press). The presence of the relatively crude stamped medium height collared rim sherds on the Berry site could then be explained as being indicative of a nascent trait which bloomed later into the sophisticated incised medium height and high collars with overhanging castellations that occur at Salem and Roebuck.

The second possibility arises from the fact that no non-Iroquois sites that are recognized as being coeval with Salem, Roebuck, or with any other Iroquois sites in that area have been located in the St. Lawrence River valley. It may be that the Berry site is such a component. Should this be so, the stamped low-collared and collarless ware may represent the native trait of a non-Iroquois people, and the crude medium height and high collars reminiscent of Salem and Roebuck may be nothing more than crude imitations of middle and late Iroquois pottery by a less adept group. Should this be the case, the occurrence of uncastellated stamped low-collared and collarless sherds, many with decorated lips, at Roebuck, Salem, Grays Creek, and

Beckstead may represent an alien non-Iroquois group living together with the Iroquois of the time on a single site as allies, or prisoners, or simply being tolerated. Certainly there can be no case made for there being horizontal or vertical components at Roebuck, Salem, Grays Creek, or Beckstead in view of the random horizontal and vertical occurrence of the two groups of pottery on those sites.

At present the first possibility is favoured, but until such time as some basis can be found to confirm the case, neither can be suggested with any certainty.

Nevertheless certain characteristics of the Berry site and conclusions arising therefrom appear to be worthy of note.

Ritchie and MacNeish (1949, Fig. 43, and p. 121) indicate that in New York State check-stamped body sherds prevail in their Owasco sequence and reach a peak, 36 per cent, on the late Owasco Bainbridge site which they see as a Mohawk antecedent (*ibid.*, p. 122). Emerson (1954, p. 80) suggests that the check-stamped body sherd trait also occurs early in the Ontario Iroquois sequence. On this basis the Berry site, with 34.6 per cent of the body sherds check-stamp decorated, is earlier than Roebuck with 10 per cent so decorated (Emerson, 1954, p. 80), Salem with 14 per cent (Pendergast, 1965, in press), Grays Creek with 14.6 per cent (*ibid.*), or Beckstead with 14.3 per cent (*ibid.*). On the other hand, the Berry site does not appear to be so old as the Gogo site (Pendergast, 1964) where 78.4 per cent of the body sherds are check-stamp decorated.

At Roebuck, which has been dated at 560 years B.P. ± 100 by C14 dating (M-1538), 7.8 per cent of the rim sherds have been classified stamp decorated low-collared or collarless as a result of my re-analysis of the Roebuck pottery sample in the National Museum of Canada. At Salem, 15 per cent of the pottery falls in this category, while at Grays Creek it represents 17 per cent of the sample, and at Beckstead it is 13 per cent. On the basis that at least a portion of this group of rim sherds is an early Iroquois trait (Wintemberg, 1936, p. 36, 123), Salem, Grays Creek, and Beckstead, in that order, were assessed as being earlier than Roebuck (Pendergast, 1965, in press). In the sample of rim sherds from the Gogo site nearby on the St. Lawrence River (Lake St. Francis), 28.1 per cent are stamp low-collared and collarless (Pendergast, 1964). On the Berry site 64.2 per cent are in this category. On this basis it appears that the Berry site is earlier than any of the others mentioned. However, it should also be noted that, as regards the Gogo site at least, this conclusion is contradictory to the one arrived at on the basis of the incidence of check-stamped body sherds.

The prevalence of linear stamping as a decorative technique and the presence of a few cord-wrapped stick impressed sherds suggest an earlier date for the Berry site than can be attributed to such sites as Roebuck, Salem, and Beckstead where pottery decorated with incised lines predominates (MacNeish, 1952, p. 82).

At Salem, 34.7 per cent of the lips of rim sherds are decorated; at Grays Creek, 16.3 per cent; and at Beckstead, 16.8 per cent (Pendergast, 1965, in press). In the rim sherd sample from the Gogo site on the St. Lawrence River, 7.6 per cent of the lips are decorated (Pendergast, 1964). In the Berry site sample 73.8 per cent of the lips are decorated. If the suggestion that lip decorations are an early trait (Pendergast, 1965, in press) is correct, the Berry site is the earliest of the Iroquois sites in the area. The anomaly presented by the Gogo site in this regard is not yet understood.

Five of the collared rim sherds have the notches usually found *at the base* of the collar on collared sherds from Roebuck, *under* the collar. In addition, seven collared sherds have notches at the base of the collar. The incidence of notches *under* medium height collars, as opposed to those *at the base* of such collars, appears worthy of note in the event that this trait may prove a useful time marker in the future.

On the Salem site, a number of vessels with low collars and globular bodies had elongated vertical neck sections akin to that illustrated in Figure 1, Medium Height Collar 'K.' Vessels with similar neck sections occurred on the small river sites (Pendergast, 1964, Plate 1, fig. 22). It may be that this trait will emerge as a characteristic of early and middle Iroquois in the area.

Emerson (1954, p. 85) suggests that castellations are more prevalent on late Iroquois sites than on early sites. At Roebuck 39.4 per cent of the rim sherds are castellated (Emerson, *ibid.*), at Beckstead 22.6 per cent are castellated (Pendergast, 1965, in press), at Salem 15 per cent (*ibid.*), and Grays Creek 12.4 per cent (*ibid.*). In the sample of rim sherds from the Gogo site 17.1 per cent are castellated (Pendergast, 1964). Castellations occur on only 8.3 per cent of the Berry site rim sherd sample; hence it is concluded, on the basis of this trait, that the Berry site is earlier than the others mentioned.

Emerson (*ibid.*) also considers ridged or carinated shoulders "an early to middle period feature reaching its peak development at Roebuck times and dying out again at the contact period." Miller, in private correspondence, also suggests the trait reached its greatest popularity late in the Iroquois sequence in the Vermont area. At Salem 56 per cent of the shoulders are carinated, at Beckstead 52 per cent, and at Grays Creek 37 per cent (Pendergast, 1965, in press). On the Gogo site, one of the small Iroquois sites on the St. Lawrence River, 17.9 per cent of the shoulders are carinated (Pendergast, 1964). From Figure 1 it can be seen that in the sample from the Berry site only shoulder shapes A, B, and F approach the degree of carination which occurs at Roebuck and Salem. However, to ensure that an interpretation of *degree* of carination does not unduly influence the discussion, it is assumed that shapes A to L inclusive can be so classified. On this basis, 31.6 per cent of the Berry site shoulder sherds are carinated. This then places the Berry site between Gogo and Grays Creek, relatively early in the local Iroquois sequence.

A quantitative comparison of the incidence of the ceramic traits judged to be significant time markers (MacNeish, Emerson, Miller, Pendergast, *ibid.*) are set out in Table 4. These traits suggest a fairly consistent sequence for sites in the area. On the basis of these traits, the Berry site emerges as the earliest on three criteria; the incidence of stamped low-collared and collarless ware, castellations, and decorated lips. Gogo, one of the nine small Iroquois sites on the St. Lawrence River (Pendergast, 1964), shows up earliest on the basis of carinated shoulders and check-stamped body sherds. Thereafter Salem, Grays Creek, and Beckstead appear generally as a group earlier than Roebuck.

The incidence of lip decorations and castellations grossly distorts the place held by the Gogo site in the sequence. The significance of this anomaly is not yet understood, but it appears to indicate that the incidence of decorated lips and castellations cannot be used alone as a time marker. No reason can yet be suggested for the transposed positions of the Gogo and Berry sites when assessed on the incidence of carinated shoulders and check-stamped body sherds *vis-à-vis* the other three traits.

The total lack of worked phalanges, discs, and bird-bone beads in the Berry site sample is of interest, but the smallness of the sample and poor bone preservation could be responsible for this situation. Table 5 sets out the incidence of these artifacts on excavated Iroquois sites in the St. Lawrence River valley. Emerson (1954, p. 91) states that worked deer phalanges have considerable diagnostic value in western Ontario. He suggests that the cup-and-pin variety is indicative of early sites in that area and that it reached its peak at Uren. The ground or toggle form he considers to be a late trait, deriving its impetus from Roebuck. Emerson's thesis appears to be applicable in Eastern Ontario with the exception of the Grays Creek site. The absence of this item on the Gogo and Berry sites appears to support the conclusion that they are early sites—possibly before the trait was introduced. The lack of discs and bird-bone beads on Gogo and Berry may also be attributable to this factor although sample size and bone preservation may again be critical factors. However, the presence in the Berry site sample of three scored and broken bird bones makes such a conclusion regarding bird-bone beads somewhat tenuous.

The Berry site pipe sample, small though it is, leaves one with an impression of inferior workmanship. It also suggests a lack of the aesthetic qualities necessary to produce the sophisticated effigy and decorated pipes which occur on the middle and late Iroquois sites in the St. Lawrence River valley as evidenced by those from Crystal Rock (Pendergast, 1962), Salem and Beckstead (Pendergast, 1965, in press), and Roebuck (Wintemberg, 1936). This also appears to hold true *vis-à-vis* the Watertown, New York, area Iroquois (Skinner, 1921) and the earlier Owasco sequence (Ritchie, 1944, p. 30).

The polished grey soapstone maskette pendant recovered from the surface of the northeast quarter of the site earns particular notice (Plate I, fig. 3). It, together with the incipient pointed castellation, decorated with a stylized face consisting of three weak punctate circles, represents the only attempt at effigies, human or otherwise. Being seven-eighths inch long, five-eighths inch wide, and one-quarter inch thick, it is smaller than the antler maskette recovered from the early Owasco Snell site in eastern New York State. Its similarity to the Owasco item is striking, but there is no basis for suggesting it to be a link making the Berry and Snell sites coeval or nearly so. Indeed it might be argued that, being similar to the maskettes used by the Iroquois in colonial times, the Berry site is a late manifestation.

The site does not appear to have been located to provide natural defensive barriers similar to those at Roebuck (Wintemberg, 1936, p. 7). Rather, the area appears to have been selected to take advantage of the benefits of living on a light sandy soil. Possible among these benefits is the ease with which the soil can be worked, but the paucity of agricultural debris, e.g., corn kernels, beans, and so on, does not suggest extensive farming by the inhabitants. The distance from the St. Lawrence River on the headwaters of a minor waterway may be indicative of a desire to obtain a measure of passive defence by means of concealment. As such, it resembles the middle period Iroquois villages in Eastern Ontario which are not necessarily sited to provide defence, e.g., Salem, Beckstead, and possibly Crystal Rock and Grays Creek as opposed to later villages which were sited to provide defence, e.g., Roebuck. Pratt (1963, p. 61, and pers. comm.) also notes this difference in siting and defensive works on early Oneida sites in New York State as opposed to late Oneida sites.

No pretence is made that the sample from the Berry site is sufficiently large to verify some of the conclusions and suggestions set out in this paper. It is not. But it should also be recognized that there is good reason to believe that sites of this nature are characteristically small and shallow. As such, it is likely that the statistical depth of sample necessary to confirm or deny the suggestions put forward in this paper will stem from small samples from a number of sites rather than from a large sample from a single site. Failure to consider the sample because it is small is tantamount to ignoring what appears to be an important horizon in Eastern Ontario and southern Quebec, simply because the sample fails to meet preconceived ideas of what constitutes an acceptable sample. The existence of three very small but similar sites in the vicinity of the Berry site, and possibly one or two others west of Cornwall on the St. Lawrence River, suggests there is a complex of these sites in the area. It remains to test them and obtain the number of samples necessary to confirm or deny the suggestions set out in this paper.

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TABLE 1

RIM SHERDS; LOCATION RECOVERED; CORRELATION OF RIM SHAPES, MOTIFS, AND TECHNIQUES

Location Recovered	Rim Shape	Motif and Technique	Remarks
Pit No. 1	B	47	—
	D	32	—
	G	41	—
	R	5	—
	CC	19	Four sherds same pot
	DD	31	—
	FF	6	—
	GG	10	Two sherds same pot
	HH	38	Castellation Plate II, fig. 16
	TT	49	—
	XX	8	—
	YY	2	Four sherds same pot
	DDD	18	
Pit No. 2	C	45	Sherd just short of castellation; collar has one-half inch overhang
	E	42	Two sherds same pot
	M	11	Two sherds same pot; one other sherd same pot from Area No. 1
	P	3	—
	S	15	—
	VV	9	Four sherds same pot
Surface Area No. 1	J	44	Six sherds same pot
	O	?	Motif weathered off
	T	16	—
	WW	39	—
Excavated Area No. 1	N	48	Plait oblique incised lines approx. two inches long on neck only decoration
	Q	13	—
	X	11	—
	Z	12	Possibly same pot as M/11
	KK	17	Possibly same pot as PP/17
	LL	4	—
	PP	17	Possibly same pot as KK/17
	ZZ	14	—
Surface Area No. 2	A	—	Castellation Plate II, fig. 14
	F	—	Castellation Plate II, fig. 15
	H	46	—
	K	33	—
	L (?)	34	—
	Y	20	—
Surface Northeast Quarter	QQ	21	Five sherds same pot
Surface Southeast Quarter	BB	7	—
Surface Southwest Quarter	L	22	—
	SS	35	—
	L	23	—
Surface Northwest Quarter	RR	18	Four sherds same pot

TABLE 1 (Continued)

Location Recovered	Rim Shape	Motif and Technique	Remarks
Test Trench No. 1 Square 1	OO	18	—
Test Trench No. 1 Square 2	V	29	—
	AA	1	Three sherds same pot
	JJ	28	Castellation Plate II, fig. 18
	CCC	18	—
Test Trench No. 1 Square 3	K	43	Castellation Plate II, fig. 17 same pot
	L	25	—
	U	48	—
	W	27	Two sherds same pot
	EE	26	—
	NN	30	—
	AAA	40	—
Test Trench No. 1 Square 4	MM	24	—
	UU	36	—
	BBB	37	—

TABLE 2

COLLAR FRAGMENTS; LOCATION RECOVERED; SHAPE, MOTIF, AND TECHNIQUE

Location Recovered	Shape	Motif and Technique	Remarks
Pit No. 1	B	Irregular shallow notches below collar	—
	G	Light vertical incised lines over shallow notches	—
	?	Irregular incised chevrons single horizontal incised lines, notched collar base	Two sherds —
	?	Fingernail incised parallel oblique lines, faint oblique lines on lip	—
Pit No. 2	?	Incised chevrons	—
	?	Shallow incised chevrons with ladder plait decoration	—
	?	Notched below collar	—
Surface Area No. 1	A	Incised parallel horizontal lines over oblique oval stamp	—
	L	?	—
	?	Oblique incised parallel lines over incised parallel horizontal lines, lip transverse paddle-edge impressions	—
	?	Cross-hatched impressions on lip	Two sherds
	?	Incised chevrons	Three sherds
Excavated Area 1	?	Short vertical oval stamp over two incised horizontal parallel lines over long oblique oval stamp	—
	?	Parallel trailed (dragged) horizontal lines	—
	H	Short oblique oval stamp between single horizontal incised lines over long oblique incised lines	—
Surface Area 2	C	?	—
	E	Notches base collar	—
	K	Fragment of motif 34	—
Surface Southeast Quarter	J	Notches base collar	—
Surface Northwest Quarter	D	Triangular notches base collar	—
Test Trench No. 1 Square 2	F	Oblique incised lines over notches base collar	—

TABLE 3

SHOULDER SHERDS; LOCATION RECOVERED; CORRELATION SHAPES, MOTIFS, AND TECHNIQUES

Location Recovered	Shape	Motif and Technique	Remarks
Pit No. 1	F	—	—
	H	—	—
	J	—	—
	N	—	—
	P	—	Two sherds
	Q	—	—
	S	—	—
	T	—	—
	U	—	—
	V	—	—
	W	—	—
	X	—	—
	AA	8	—
	HH	—	—
	JJ	—	—
Pit No. 2	Z	—	—
Surface Area No. 1	G	—	—
	Y	1	—
	BB	7	—
	DD	—	—
	FF	—	—
Surface Area No. 2	B	—	—
	D	—	—
	EE	—	—
Excavated Area No. 2	L	—	—
	O	—	—
	GG	6	—
Surface Southeast Quarter	M	—	—
	KK	—	Two sherds
Surface Northwest Quarter	C	—	—
Test Trench No. 1 Square 1	K	9	—
Test Trench No. 1 Square 2	E	4	—
Test Trench No. 1 Square 3	A	5	—
	G	—	—
	CC	3	—
Test Trench No. 1 Square 4	R	2	—
	GG	6	—

TABLE 4

COMPARISON OF CERAMIC TRAITS: BY PERCENTAGES

Stamped Low-Collared and Collarless rims		Decorated Lips		Castellations		Carinated Shoulders		Check-stamped Body Sherds	
Berry	64.2	Berry	73.8	Berry	8.3	Gogo	17.9	Gogo	78.4
Gogo	28.1	Salem	34.7	Grays Creek	12.4	Berry	31.6	Berry	34.6
Grays Creek	17	Beckstead	16.8	Salem	15	Grays Creek	37	Grays Creek	14.6
Salem	15	Grays Creek	16.3	Gogo	17.1	Beckstead	52	Beckstead	14.3
Beckstead	13	Gogo	7.6	Beckstead	22.6	Salem	56	Salem	14
Roebuck	7.8	Roebuck	few?	Roebuck	39.4	Roebuck	many?	Roebuck	10

TABLE 5

COMPARISON INCIDENCE OF DISCS, BEADS, AND PHALANGES

	Roebuck	Salem	Grays Creek	Beckstead	Gogo	Berry
Discs, stone	18	46	1	—	—	—
Discs, pottery	48	82	10	5	—	—
Beads, bird-bone	43	5	—	4	—	—
Phalanges, cup-and-pin	9	29	2	1	—	—
Phalanges, toggle	286	12	5	1	—	—
Totals	404	174	18	11	0	0

PLATES and FIGURES

PLATE I

(One-half natural size with exception of Figs. 3 and 4 which are actual size)

Fig.

1—Pipe bowl fragment from surface northwest quarter of site
2—Pipe bowl fragment excavated Area 1
3—Soapstone maskette from surface northwest quarter of site
4—Worked quartzite fragment excavated Area 1
5—Rim sherd from Pit No 1, D/32
6—Rim sherd from Pit No 2, C/45
7—Rim sherd from Pit No 2, E/42
8—Rim sherd from Pit No 1, B/47
9—Rim sherd from surface Area 1, J/44
10—Rim sherd from Pit No 1, HH/38; castellation Plate II, fig. 16, from same pot
11—Rim sherd from surface Area 2, H/46
12—Fragmentary rim sherd from Pit No 2, H/?
13—Rim sherd from surface Area 2, K/33
14—Fragmentary rim sherd from Area 1, H/?; castellation Plate II, fig. 17, from same pot
15—Fragmentary rim sherd from Pit No 1, H/?
16—Rim sherd from Pit No 1, DD/31

1

2

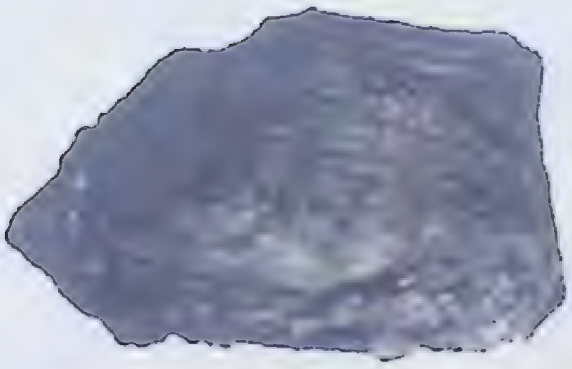
3

4

5

6

7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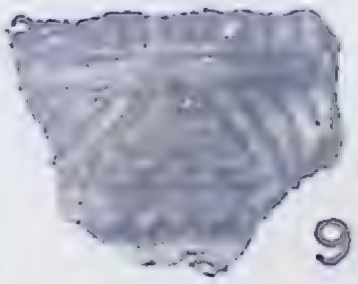
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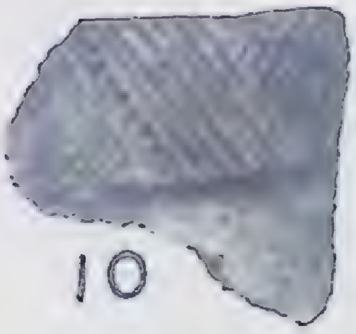
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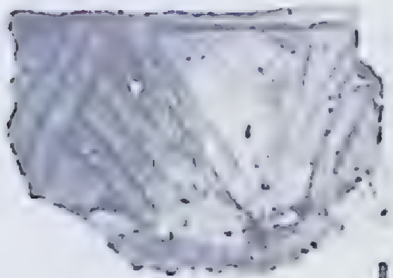
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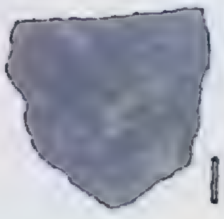
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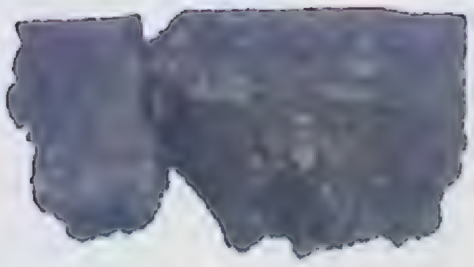
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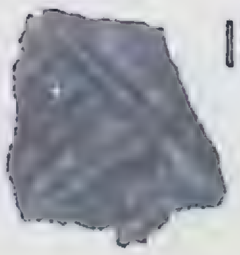
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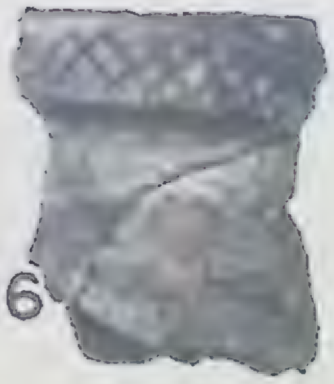
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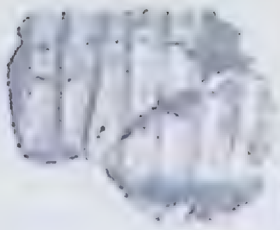
PLATE II

(One-half natural size)

Fig.

1—Rim sherd from surface southwest quarter, L/22
2—Rim sherd from Pit No 1, CC/19
3—Rim sherd from Test Trench No 1, Square 3, NN/30
4—Rim sherd from Pit No 1, GG/10
5—Rim sherd from Test Trench No 1, Square 1, OO/18
6—Rim sherd excavated Area 1, KK/17, possible same pot as PP/17
7—Rim sherd excavated Area 1, LL/4
8—Rim sherd excavated Area 1, PP/17
9—Rim sherd from Pit No 1, YY/2
10—Rim sherd from Pit No 2, VV/9
11—Rim sherd from Pit No 2, P/3
12—Rim sherd from Pit No 2, M/11
13—Rim sherd excavated Area 1, N/48
14—Castellation from surface Area 2, A/?
15—Castellation from surface Area 2, F/?
16—Castellation from Pit No 1, from same pot, Plate I, fig. 10
17—Castellation from Test Trench No 1, Square 3, from same pot, Plate I, fig. 14
18—Castellation from Test Trench No 1, Square 2, JJ/28

(Rim sherds 1 to 8 inclusive are low collared, 9 and 10 rolled collared, and 11 to 13 inclusive are collarless)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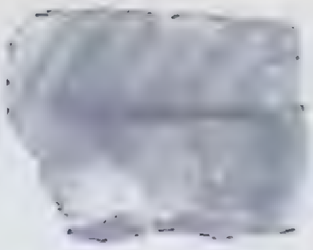
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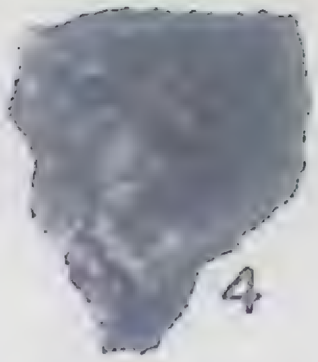
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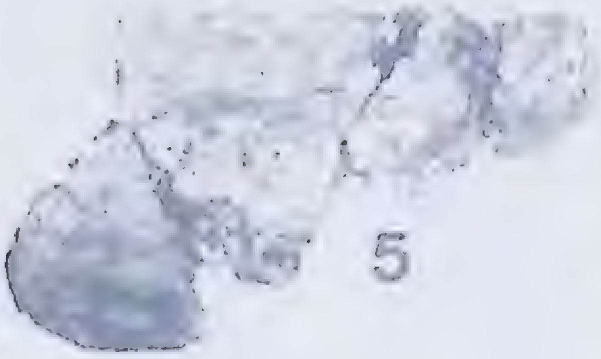
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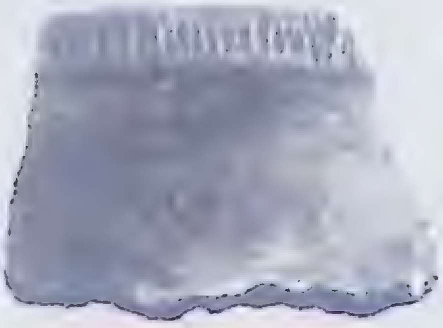
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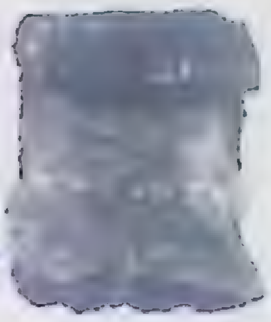
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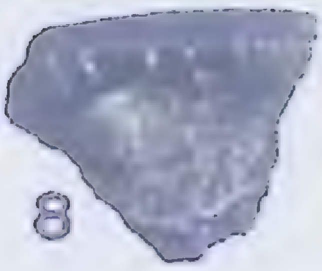
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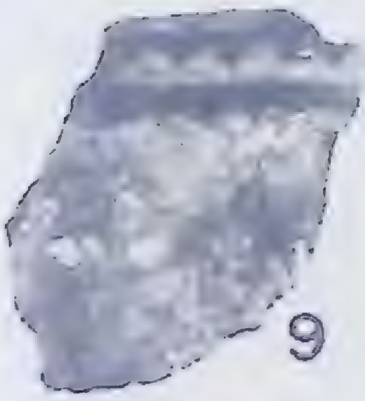
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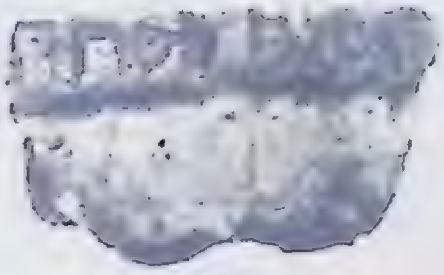
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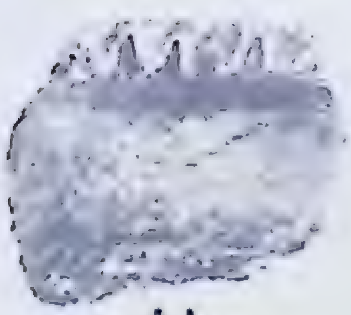
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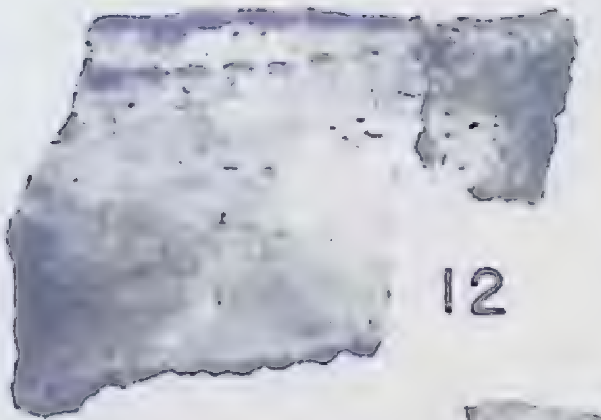
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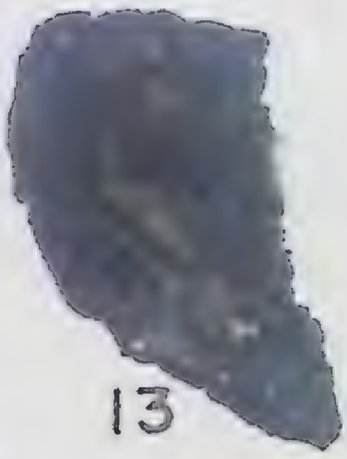
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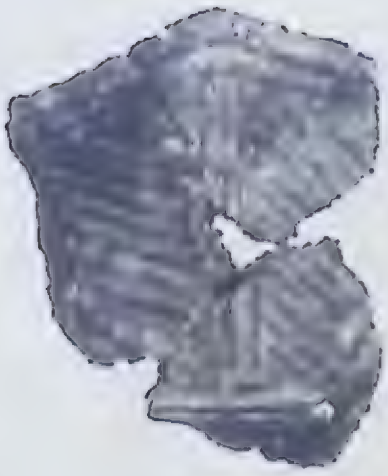
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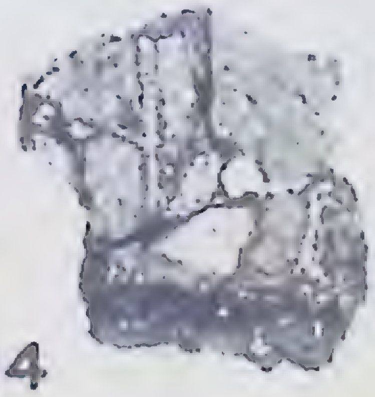
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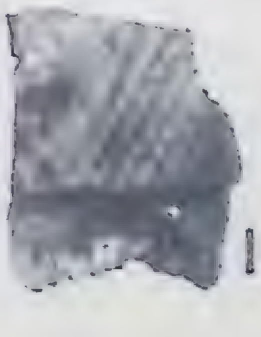
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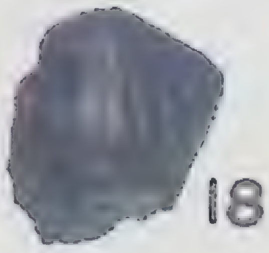
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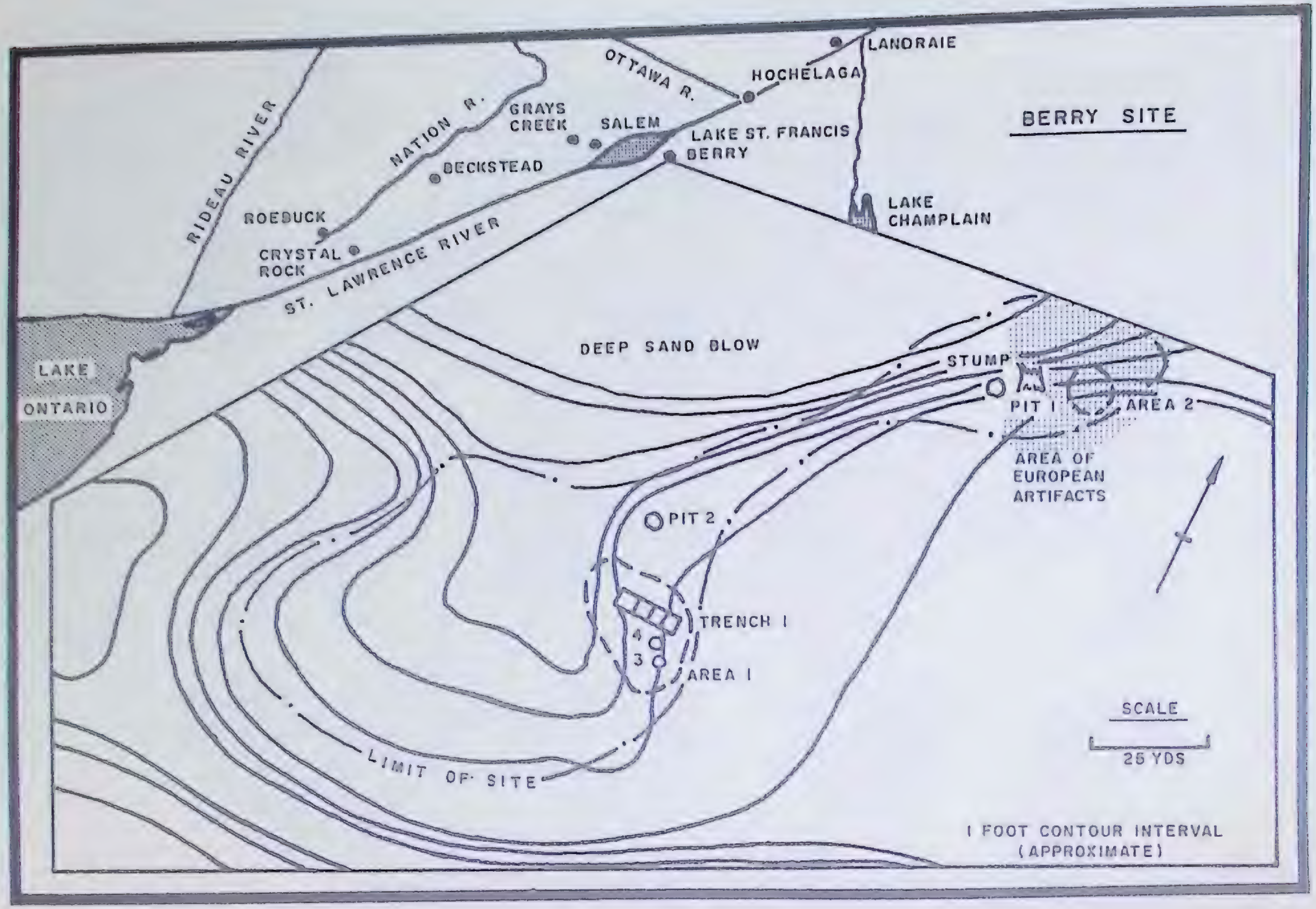

FIGURE 1—*Berry Site*

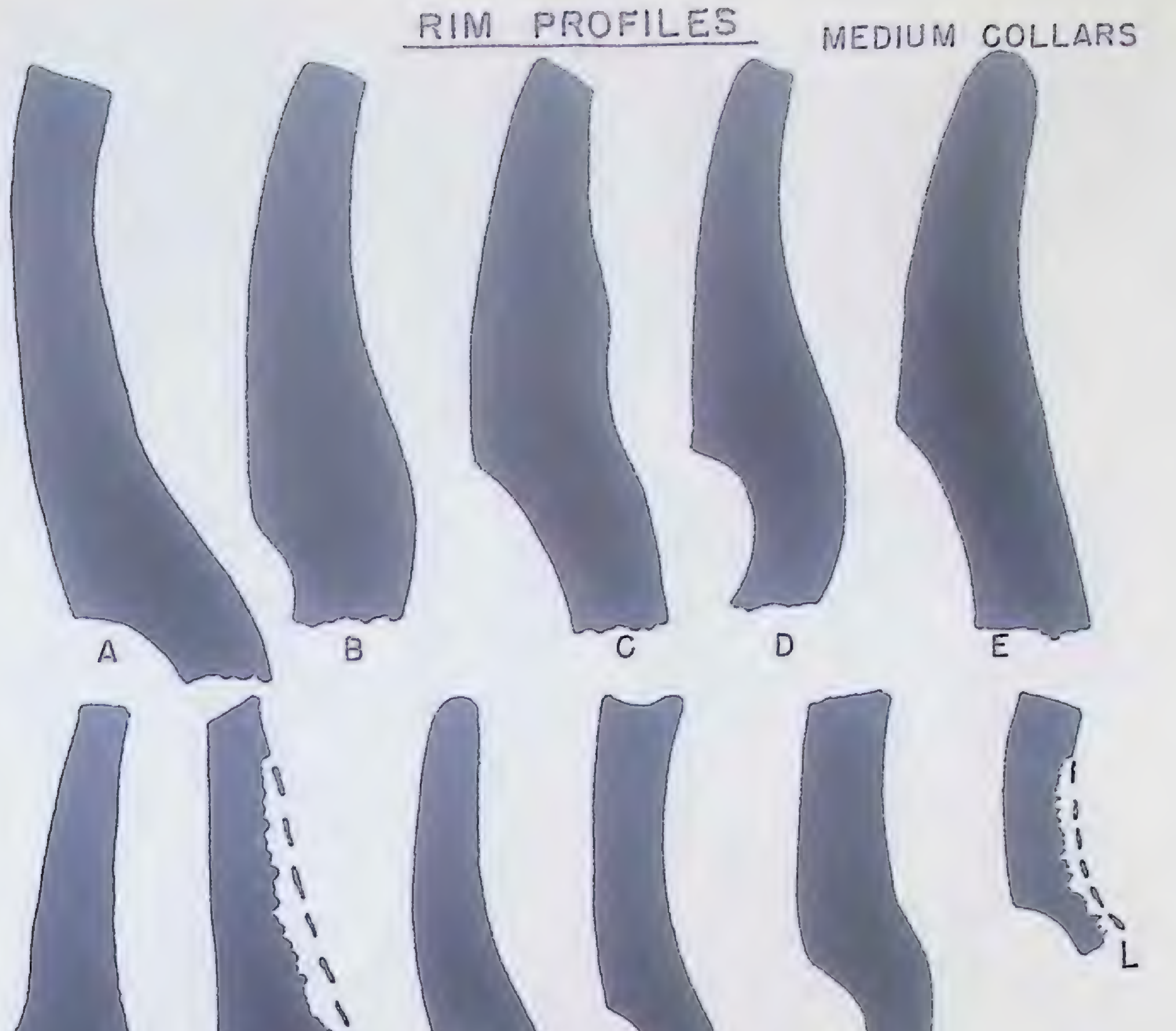

Figure 2a—*Rim Profiles: medium collars; thickened and parallel lips*

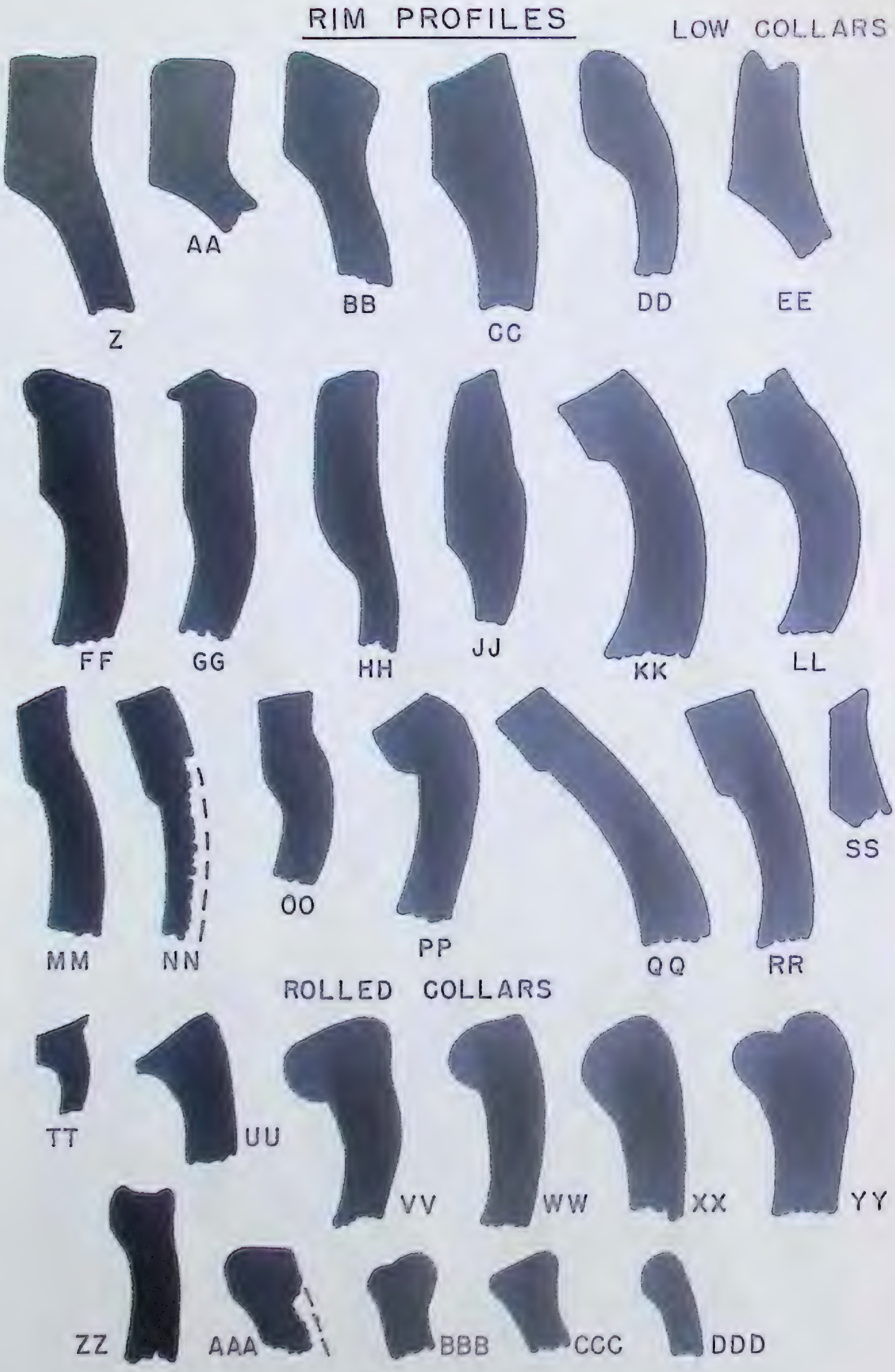

Figure 2b—*Rim Profiles: low collars; rolled collars*

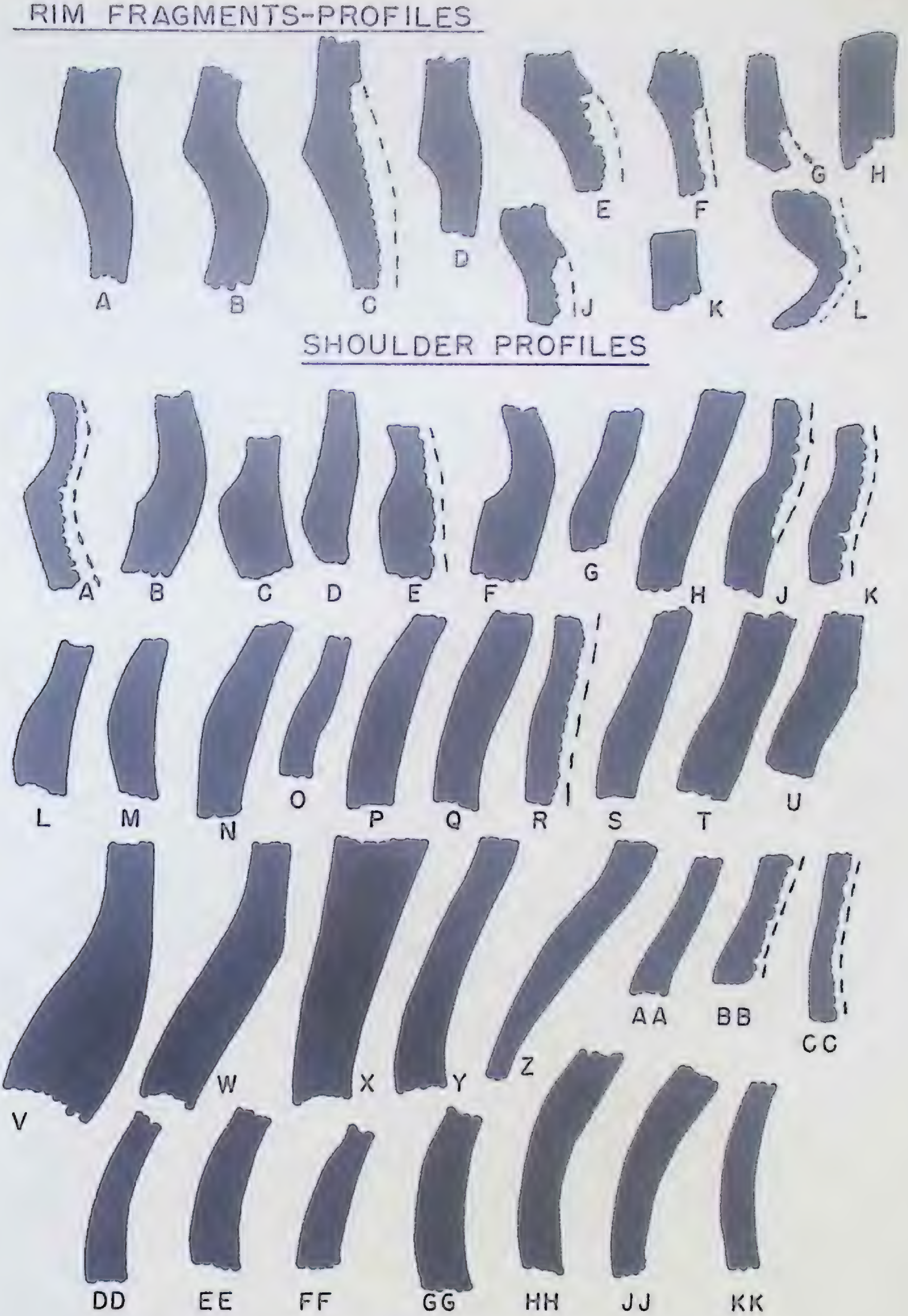

Figure 2c—*Rim Fragments—Profiles; Shoulder Profiles*

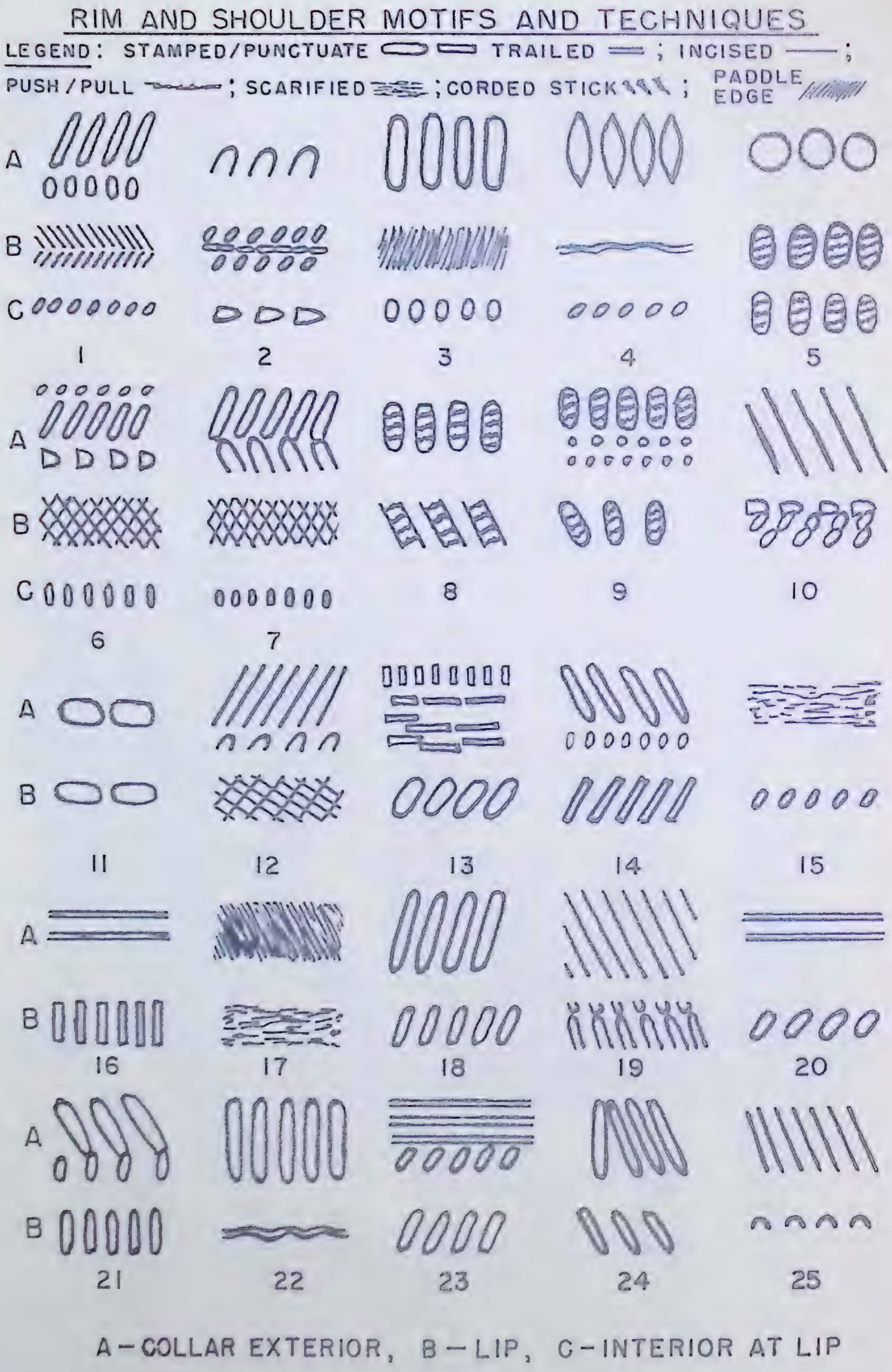
RIM AND SHOULDER MOTIFS AND TECHNIQUES
LEGEND: STAMPED/PUNCTUATE ; TRAILED ; INCISED ;
PUSH/PULL ; SCARIFIED ; CORDED STICK ; PADDLE EDGE
A
B
C
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
A—COLLAR EXTERIOR, B—LIP, C—INTERIOR AT LIP

FIGURE 32—*Rim and Shoulder Motifs and Techniques*

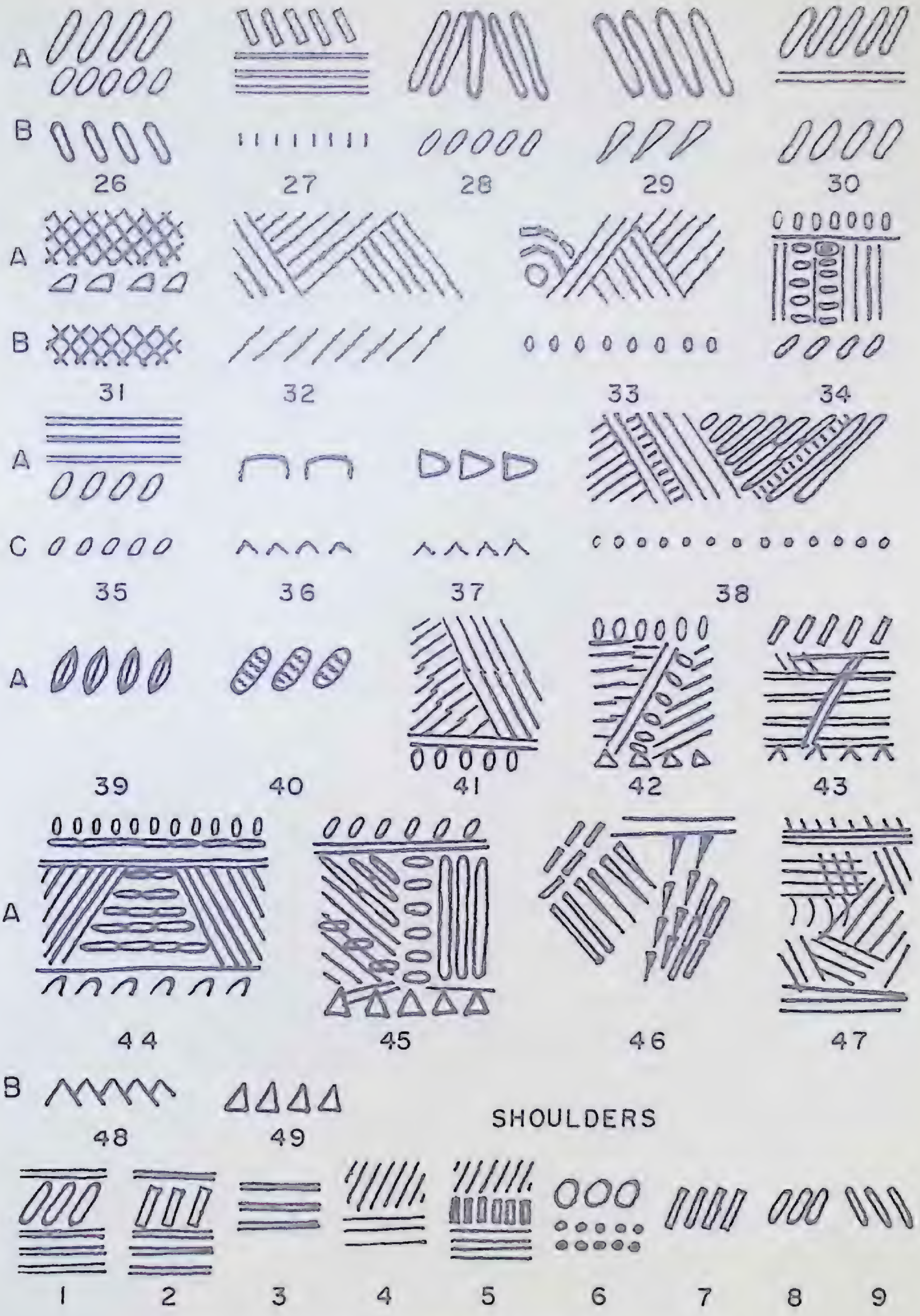

FIGURE 3b—*Rim and Shoulder Motifs and Techniques* (*Cont.*)

THE PIC RIVER SITE[1]

A STRATIFIED LATE WOODLAND SITE ON THE NORTH SHORE OF LAKE SUPERIOR

J. V. WRIGHT

RÉSUMÉ

Le gisement stratifié de la rivière du Pic, sur la rive nord du lac Supérieur, renferme trois éléments qui s'échelonnent depuis les temps historiques jusqu'en l'an 950 après J.-C. Les spécimens ethnohistoriques recueillis indiquent que l'élément historique provient peut-être des Ojibways. Pendant toute cette période d'environ 800 ans, il semble s'être produit une évolution relativement lente de la culture. Les poteries du dernier et du premier élément constituent un mélange de traditions céramiques différentes qui témoigne qu'elles ont subi des influences en provenance tant de l'Ouest que du Sud-Est. De fait, le nombre de poteries par rapport aux objets façonnés d'autres catégories et le mélange de diverses traditions céramiques dans un seul élément laissent supposer que l'art de la poterie constitue à cet endroit un trait d'emprunt. Les résultats relativement abondants des fouilles archéologiques effectuées au gisement de la rivière du Pic en font l'un des plus importants pour approfondir l'histoire culturelle des Ojibways qui vivaient sur la rive nord du lac Supérieur.

SUMMARY

The stratified Pic River site on the north shore of Lake Superior contains three components ranging in time from the historic period to A.D. 950. Ethnohistoric evidence suggests that the historic component may be attributed to the Ojibwa. Throughout this time span of approximately 800 years, a condition of relatively slow culture change is apparent. Ceramics from the latest and the earliest components represent a mixture of different ceramic traditions, an indication that influences were being derived from both the west and the southeast. Indeed, the frequency of ceramics relative to other artifact categories and the mixture of ceramic traditions within a single component suggest that ceramics at the site represent a borrowed trait. The relatively rich archaeological record from the Pic River site makes it one of the most important stations from which to acquire an understanding of Ojibwa culture history along the north shore of Lake Superior.

The Pic River site was first recorded during an archaeological survey of the Lake Superior basin in 1957 by James B. Griffin and George L. Quimby (Quimby, 1958; 1961). In 1959, J. Norman Emerson of the University of Toronto examined the site, and during the field seasons of 1960 and 1961 he carried out extensive excavations. Dr. Emerson, with the permission of the

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[1] This paper was originally submitted in November 1963 to be included in a proposed publication honouring the late Professor T. F. McIlwraith. Because of various circumstances, the publication of the volume was not realized.

Marathon Corporation, explored two different areas of the site. The first, called the Upper Beach, was characterized by an abundance of aboriginal remains, and the second, called the Lower Beach, was characterized by an abundance of white trade items and a paucity of aboriginal artifacts. Both areas contained stratified deposits, with each habitation floor being separated by a sterile or semi-sterile lens of water- or wind-deposited sand. Dr. Emerson kindly loaned the writer all the material recovered from his excavations, and it is from these data that the present paper has been compiled.[1] The writer's own first-hand experience on the site has been limited to the test excavations of 1959 and to periodic visits during the 1960 and 1961 excavations. Only the material from the Upper Beach will be considered, because it was in this area that the major prehistoric and early historic aboriginal remains were recovered. The Lower Beach, with its abundance of white trade items, should, in the writer's estimation, be analysed by someone more knowledgeable in historic trade goods.

Since the writer was not directly involved in the excavation of the site, he has avoided a discussion of the limited number of features which were encountered. This paper presents an analysis and interpretation of the artifacts recovered from one area of the Pic River Site excavation.

The site is located at the mouth of the Pic River where it empties into Lake Superior. For a number of miles upstream the western side of the river consists of a broad sand plateau which is steeply eroded along the bank. At the mouth proper, extensive wind action has created numerous large dunes. This topography is in marked contrast to the east side of the river where the exposed Precambrian Shield, intersected by dense forest, rises above the sand plateau on the other side of the river. The river is approximately 100 yards in width at the mouth, and the current is of very low velocity for rivers along the north shore. Indeed, upstream travel is not impeded for over forty miles.

The Upper Beach area of the Pic River site occupies a restricted portion of the broad sand plateau which forms the west bank of the Pic River, and the Lower Beach area is located on a low sandy slope below the Upper Beach and between it and the river. Since it is possible that the Lower Beach area was covered by water during the earlier occupations of the Upper Beach, this could account for the scarcity of aboriginal artifacts on the Lower Beach. As can be seen on Plate I, three strata, separated from one another by sterile to semi-sterile lenses of sand, characterize the deposit of the Upper Beach. The uppermost stratum, Stratum I, was covered by 6 to 7 feet of water- and wind-deposited sand. From this stratum an abundance of white trade goods, as well as aboriginal artifacts, was recovered. On the basis of the trade goods found, it is probable that the stratum was occupied at approximately A.D. 1700. In general, the deposit averages several inches in thickness and is a dense black colour indicative of a high organic content. Stratum II is separated from Stratum I by a thick deposit of sterile to semi-sterile sand. This second stratum is dark to light brown in colour and lacks European trade items. The artifact content was sparse relative to strata I and III and appears to reflect a much shorter period of occupation. Stratum III is separated from Stratum II by a thick sterile to semi-sterile layer of sand, as was the case with strata I and II. And, as with Stratum I, this deposit is of a dense black colour and represents a major occupation level. A charcoal sample collected by Dr. J. N. Emerson from Stratum III and submitted by the writer gave a reading of A.D. 962±80 (GSC-85).

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[1] The writer also extends his appreciation to Dr. William E. Taylor, Jr., of the Archaeology Division of the National Museum of Canada, for his critical reading of the manuscript and for his helpful suggestions.

The Upper Beach area was excavated by removing the thick overburden and laying out a 5-foot grid over the exposed first stratum. Each stratum was excavated as a single level. Despite the separating lens of sand, a small amount of admixture between the strata is apparent. This is particularly true for the northern portion of the excavation where the three strata pinch together. Recognition of mixture in the sample has been limited to a small number of rim sherds found in Stratum I, which belong to the same vessels as do sherds found in Stratum III. Stratigraphic information and radiocarbon dates from other sites will be presented as evidence for the assignment of these sherds to the earliest occupation layer.

STRATUM I

There is a possibility that some of the white trade goods attributed to this stratum are actually later in time than the associated aboriginal complex. A highly organic and fibrous mat, approximately one-quarter inch in thickness, covered the top of the deposit. A number of trade items were found in or on the surface of this old duff line, whereas the aboriginal materials occurred directly below it in the black sand. Most of the trade goods, however, were in direct association with artifacts of native manufacture. As has been suggested by Quimby (1961: 88–89), this stratum is probably attributable to a historic Ojibwa group who occupied the mouth of the Pic River at approximately A.D. 1700. Definite correlations between an archaeological assemblage and the historic Algonkian speakers of the Northeast are extremely rare, although the Pic River site appears to represent a fortunate exception. Quimby's statement (1961: 89), however, that "The Chippewa are such a vast group it is likely that significant cultural differences will be found among the tribal components," should be heeded.

TRADE GOODS

An abundance and wide variety of white trade items, of both English and French manufacture, were recovered from Stratum I. Table 1 presents the occurrence and varieties of trade goods.

TABLE 1

OCCURRENCE OF HISTORIC TRADE GOODS

Items	f	%
Beads	1,156	86.6
Lead shot	70	5.2
Cut-up copper kettle fragments	24	1.8
Metal bangles	17	1.2
Gunflints	9	.7
Kaolin pipe fragments	6	.4
Metal triangles	5	.3
Lead strips	5	.3
Metal triangular pendants	4	.3
Iron strips	4	.3
Musket balls	3	.2
Ferrules for ramrods (?)	3	.2
Glass fragments	3	.2
Metal wire	3	.2
Buttons	3	.2
Brass tacks	3	.2
China fragments	2	.2
Iron fishhooks	2	.2
Metal finger rings	2	.2
Handwrought iron nails	2	.2
Clasp knife	1	.1
Projectile point made from trade kettle	1	.1
Iron needle with eye-hole	1	.1
Metal bell	1	.1
Iron strike-a-light	1	.1
Iron awl	1	.1
Woven copper fabric	1	.1
Iron chisel	1	.1
Ivory comb	1	.1
TOTALS	1,335	100.0

Beads (Plate II, fig. 27)

Five form classes of trade beads were encountered in the Upper Beach excavation. Most common were the small seed beads, which are fairly consistently 3 mm in diameter and range from 2 mm to 3 mm in length. Several larger seed beads, 4 mm in diameter and from 3 mm to 5 mm in length were found. Cylindrical beads were consistently 3 mm in diameter but ranged from 5 mm to 10 mm in length with a mean of 9.0 mm. Elliptical or football-shaped beads were fairly common. Diameters ranged from 4 mm to 7 mm with a mean of 5.1 mm; length ranged from 7 mm to 11 mm with a mean of 8.6 mm. Large ovate beads, of which only four specimens were recovered, comprise the final class of beads. These specimens ranged from 8 mm to 10 mm in diameter and from 6 mm to 10 mm in length with respective means of 9.0 mm and 8.0 mm.

Table 2 gives the frequencies of the five classes of beads as well as the frequency of colour varieties found. Generally, the colour category was quite homogenous, although occasional variations were noted. This was particularly true for the colour 'blue.' The frequencies of the other historic items are given in Table 1.

TABLE 2
TRADE BEADS

Class	Colour	f	%
Small Seed	White	711	61.5
	Blue	303	26.2
	Red	35	3.0
	Green	17	1.5
	Black	9	.8
	Yellow	1	.1
	White with red stripes	1	.1
Large Seed	White	2	.2
	Blue	1	.1
Cylindrical	White	41	3.5
	Blue	2	.2
	Green	1	.1
Elliptical	White	16	1.4
	Black	4	.3
	White with brown stripes	4	.3
	Yellow	3	.3
	Red	1	.1
Large Ovate	Black	3	.3
	White	1	.1
Totals		1,156	100.1

Lead Shot (Plate II, fig. 15)

Lead shot ranged from 3 mm to 6 mm in diameter with a mean of 3.8 mm. Most of the shot was either 3 mm or 5 mm in diameter.

Cut-up Copper Kettle Fragments

Numerous fragments cut from copper kettles were found in the stratum. The fragments tend to be rectangular in shape, and it would appear that such strips represent the waste product from the manufacture of bangles, arrowheads, and other such items.

Metal Bangles (Plate II, figs. 34–36)

Metal bangles, which probably decorated clothing, were fairly common. Thirteen specimens were manufactured from copper kettle strips, and the remainder were made from strips of iron. One of the copper specimens possessed a wooden plug, and when this was removed, a blue bead was found at the apex of the cone. All the bangles were markedly conical in shape and ranged from 13 mm to 58 mm in length with a mean of 26.5 mm, and basal diameters ranged from 3 mm to 17 mm with a mean of 5.6 mm.

Kaolin Pipe Fragments (Plate II, fig. 23)

Three stem fragments and two bowl fragments of kaolin pipes were recovered. No markings were visible on any of the fragments.

Metal Triangles (Plate II, fig. 33)

Five triangular objects, cut from trade kettle copper, were found. In every case the apex of the triangle had been cut off, suggesting that they did not function as arrowheads. They may have been attached to clothing as decoration.

Gunflints (Plate II, figs. 19, 20)

Nine gunflints were found in the stratum. Five of the specimens appear to be French in origin, two are English, and the remainder are too fragmentary for identification. The method used in separating the gunflints into French or English varieties follows Maxwell and Binford (1961: 99) with the English flints being manufactured from sectioned blades and the French ones from single spalls struck from a cobble core.

Lead Strips

All the fragments represented flattened pieces of lead which had been cut into strips.

Metal Triangular Pendants (Plate II, fig. 32)

Of the four specimens present, two were made from a silver alloy and one each from iron and copper. The copper and iron pendants had a single suspension hole at the apex of the triangle, and the two silver specimens had perforations at both the apex and the base of the triangle.

Iron Strips

Two of the specimens appear to represent fragments of barrel stays. One semilunar-shaped fragment possesses slight bevelling along the convex edge and may have functioned as a scraper or knife.

Musket Balls (Plate II, fig. 16)

Only three lead musket balls were found in the stratum. All three had diameters of 14 mm.

Ferrules for Ramrods (?) (Plate II, fig. 30)

Three examples of what are thought to be brass ferrules off ramrods were recovered. All the specimens are 12 mm in length and possess rivet or nail holes. The diameter of the single uncrushed ferrule was 12 mm.

Glass Fragments

The glass fragments, lacking any distinctive markings, consist of two dark brown fragments and one pale green fragment.

Metal Wire

Two pieces of iron wire had diameters of 1 mm, and the single fragment of brass wire had a diameter of .5 mm.

Buttons (Plate II, fig. 28)

The one plain cast brass button with shank would appear to date between A.D. 1700 and 1765 (Olsen, 1963). Another cast brass button with shank had decorative etching and iron rosettes on the face. A single silver specimen, which may actually be a buckle, was inscribed with the letters NR.

Brass Tacks

These three identical tacks have a rounded head and a square cross-section shaft. In each case the shaft was sharply bent, suggesting that the tacks may have functioned as decorative studs.

China Fragments

Both sherds possessed a floral motif.

Iron Fishhooks (Plate II, fig. 22)

The two fishhooks were of exactly the same size and form. Instead of an eye-hole for the line attachment, the end of the shank was flattened.

Metal Finger Rings

Two plain finger rings were found. Both appear to have been made from brass and are not of local manufacture.

Handwrought Iron Nails

Two handwrought iron nails were recovered. One of the specimens had been bent to form a fishhook.

Clasp Knife (Plate II, fig. 31)

The only knife to be found in the stratum was a French clasp knife.

Projectile Point made from Trade Kettle (Plate II, fig. 29)

This small pentagonal point had been carefully sharpened along both major edges.

Iron Needle with Eye-hole

The specimen is not unlike present day needles except that it tends to be slightly thicker.

Metal Bell

This brass or copper specimen may represent half of a hollow French button rather than a bell. If it was a bell, it does not appear to have possessed a clapper.

Iron Strike-a-Light (Plate II, fig. 26)

One ovate strike-a-light was recovered from the stratum.

Iron Awl

This single pointed awl appears to have been fashioned out of a large handwrought iron spike. It measured 165 mm in length and was irregularly square in cross-section.

Woven Copper Fabric

Several fragments of this fabric were found in the stratum. This fabric appears to consist of a thin copper or brass thread woven into a cloth. The presence of the copper salts has preserved the remaining fabric. It occurs in strands approximately 25 mm wide and may have functioned as braiding or belt material.

Iron Chisel

This specimen was manufactured from a large iron spike whose end was hammered to form a chisel edge.

Ivory Comb

A single, double-edged, ivory comb of probable English manufacture was found.

Though expressive of a considerable time range, the trade goods from Stratum I of the Upper Beach largely pertain to the period between A.D. 1700 and A.D. 1750. After this period the adoption of the European material culture is so complete that little can be archaeologically recognized of the aboriginal culture.

CERAMICS

Of great importance was the direct association of aboriginal ceramics and white trade goods in Stratum I of the Pic River Site. If Stratum I is a historic Ojibwa component, as Quimby's (1961) review of the ethnohistoric data suggests, then the archaeological complex of at least a portion of the Ojibwa or Chippewa, can be examined for the first time.

Rim Sherds

The rim sherds from Stratum I represent three different ceramic complexes. The most common of these ceramic assemblages appears to have been introduced from western Michigan. Also well represented in the stratum is a ceramic complex which is regarded as a development out of the indigenous Blackduck focus. A single rim sherd attributable to the Selkirk focus was recovered. This mixture of different ceramic complexes appears to be very characteristic of the early historic components along the north shore of Lake Superior and may reflect the unstable situation created by the fur trade and the aspirations of the Iroquois League from A.D. 1650 to A.D. 1750.

The various rim sherds of the three ceramic complexes will be described under the captions 'Michigan,' 'Blackduck,' and 'Selkirk.' Also, the rims are sufficiently distinctive and of low enough frequency to allow the analysis of vessels. In short, a number of rims from a single vessel will be treated as a single specimen.

Michigan Rim Sherds

The general characteristics of this late Michigan-derived ceramic complex are as follows: collared rim; impressed horizontal motif on the collar; impressed horizontal motif on the interior rim; punctations at the base of the collar; decorated lip; frequent castellations; and chevron motif below the castellation. As the attributes seen in this ceramic complex are so different from the complexes to the north and west, there is little difficulty in recognizing it as a discreet and related assemblage. Particularly distinctive attributes are the pseudo cord-impressing technique and the horizontal motif on the interior of the rim. George I. Quimby mentions a "pseudo cord-wrapped stick impressing technique" as being one of the ceramic traits of the Porter focus of western Michigan (1952: 105). A more recent statement mentions the presence of the technique in the Peninsular Woodland culture of "the upper peninsula of Michigan, coastal Wisconsin, including the Door Peninsula, and the lower peninsula of Michigan, particularly its western half" (Quimby, 1960: 88). Also from Juntunen site in the Straits of Mackinac, Alan L. McPherron (1963: 573–74) states: "The second readily distinguishable ware is characterized by collars, castellations, and a preponderance of the push-and-pull decorative technique . . ." and that "Its appearance on the Juntunen site can be expected to fall some time later than the latest of the three radiocarbon dates previously discussed, A.D. 1070 ± 150." The writer has also seen samples of the pottery complex under consideration from northern Michigan in the collections of the Museum of Anthropology, University of Michigan. Actually, the pseudo cord-impressed technique appears to have been realized by a very precise application of the linear punctate or stab-and-drag technique. The following descriptions present the major attributes of the different specimens from Stratum I.

Specimen 1 (Plate II, fig. 5)

Form: The rim has a high collar (36 mm) with a convex interior and a concave exterior; the base of the collar is sharply demarked from the neck, and thickness at collar base is 13 mm as opposed to the neck thickness of 8 mm directly below the collar.

Decoration: Three horizontal lines of closely spaced kidney-shaped punctates are present on the collar with slight evidence of dragging the implement from punctate to punctate. A single line of the same technique occurs under the base of the collar. The punctation technique encircles the flat lip of the vessel. On the interior rim three horizontal lines of clear linear punctates are present. These lines are spaced approximately 8 mm apart and extend to 30 mm below the lip.

Specimen 2 (Plate II, fig. 7)

Form: This specimen has a moderately high collar (29 mm) with a slightly concave interior and a straight exterior; the base of the collar overhangs the neck, and thickness at the collar base is 14 mm, as opposed to a neck thickness of 7 mm. A pointed castellation is present.

Decoration: Three horizontal lines of contiguous linear punctates occur on the collar and closely resemble twisted cord impressions. Directly below the castellation and fanning out from its apex is a double chevron motif executed with the same technique. Oblique punctations are present below the collar, and a horizontal line of linear punctation underlines the obliques just above the fracture line. The flat lip contains vertical linear punctations. On the interior of the rim three horizontal lines of the same linear punctate technique are present. The lines are spaced roughly 4 mm apart and extend as far as 20 mm below the lip.

Specimen 3

Form: The collar is 24 mm high with a convex interior and a concave exterior. The base of the collar is clearly defined from the neck with the respective thickness measurements being 11 mm and 7 mm. From the curvature of the lip it is apparent that a castellation was present.

Decoration: Three horizontal lines of closely spaced linear punctates occur on the collar. The punctations are circular in shape but have left quite irregular impressions. Evidence of a slight dragging action between the punctates is present. At the base of the collar a horizontal line of irregular punctates is present. Encircling punctates occur on the flat but slightly bevelled downward lip. Two horizontal lines of linear punctates are present on the interior of the rim. The two lines are spaced 9 mm apart and extend to 20 mm below the lip.

Specimen 4

This specimen consists of two repaired fragments, one of which came from Stratum III and the other from Stratum II. It is inferred that the specimen is intrusive from Stratum I into the earlier strata.

Form: A moderately high collar (31 mm) with a straight interior and a concave exterior is present as well as a sharply demarcated collar base which is 12 mm thick as opposed to a neck thickness of 8 mm. There is evidence that the specimen was castellated.

Decoration: Four horizontal lines of linear punctates occur on the collar. The long contiguous gashes give the appearance of a single twisted cord impression. Two oblique lines crossing the horizontal motif appear to represent a portion of the chevron motif below the castellation which is indicated by the lip curvature. At least two horizontal lines of linear punctates are present below the collar. The bevelled downward lip is decorated with vertical notches which cut the outside edge but not the interior edge. On the interior of the rim three horizontal lines of linear punctate are present. These lines are spaced approximately 8 mm apart and extend to 30 mm below the lip.

Specimen 5

Form: The specimen is too fragmented to give any form data other than that the vessel possessed a castellation.

Decoration: Three horizontal lines of irregular linear punctates are present on the exterior. Encircling punctates with the same tool are present on the flat lip. Since the interior of the sherd is lacking, no statement can be made regarding interior motif.

Specimen 6

Two rims of this specimen were found, one coming from Stratum I and the other from Stratum III. It is inferred that the rim in the earlier stratum is intrusive from Stratum I.

Form: The specimen is too fragmented to give any form data.

Decoration: At least three horizontal lines of linear punctate done with a square-tipped tool are present on the exterior rim. The same technique encircles the flat and bevelled downward lip. The interior of the rim is missing.

Specimen 7

Form: Although fragmentary, this specimen would appear to be collared since both the interior and exterior are concave.

Decoration: Directly below the lip a horizontal band of vertical impressions, executed in the linear punctate fashion to produce a ribbon-like effect, is present. Directly below this, a series of single oblique impressions, spaced 15 mm from one another, were fashioned by impressing the suture-edge of a turtle shell into the clay. Below the oblique impressions is another horizontal band the same as the one below the lip. The flat lip is decorated with simple ovate punctates. On the interior, at least two horizontal bands similar to those noted on the exterior rim were present. The two bands, spaced 11 mm apart, extend to an undeterminable distance below the lip.

Specimen 8

Form: A low incipient collar (12 mm) with a concave interior and a convex exterior was present on this rim. Thickness at the base of the collar and the neck directly below is 5 mm.

Decoration: On the collar two horizontal rows of closely spaced irregular crescentic impressions were executed by the linear punctate technique. Directly below the base of the collar, a row of irregular punctates, spaced at roughly 10 mm intervals, was present. The exterior body treatment of this vessel appears to be smoothed-over cord. The rounded lip is decorated with encircling punctates, and the interior is plain.

In addition to the preceding eight specimens, two rims were too fragmentary to describe, although there was sufficient evidence to place them within the Michigan complex.

Blackduck Rim Sherds

Rim sherd fragments representing five vessels attributable to the Blackduck focus were recovered from Stratum I. The presence of these sherds in what is almost certainly a historic Ojibway component, raises certain problems regarding the association of the Blackduck focus and the historic Assiniboine (Wilford, 1955: 136; MacNeish, 1958: 79). It has been suggested that the Blackduck focus, in part at least, may be attributed to the Ojibwa as well as the Assiniboine (Wright, 1963: 5).

The major attributes of the Blackduck focus rim sherds are as follows: everted, collarless rim with splayed-out lip; cord-wrapped stick decoration on exterior rim and on the lip; and interior bosses. A rim sherd typology is available for sherds of the Manitoba focus (MacNeish, 1958), which is largely a synonym for the Blackduck focus.

Specimen 1 (Plate II, fig. 1)

Form: This specimen possesses an everted rim with a flat and only slightly splayed-out lip. Lip thickness is 9 mm, and the neck thickness is 6 mm.

Decoration: Short, oblique cord-wrapped stick impressions extend down from the lip above two horizontal lines produced with a cord-wrapped stick. In between these two lines are circular punctates which produce interior bosses. Below the horizontal lines is the vertical to slightly oblique combing, so characteristic of the Blackduck focus. The lip is decorated with oblique cord-wrapped stick impressions, and the interior is plain. Under MacNeish's typology this specimen would be classified as Blackduck Brushed (MacNeish, 1958:159, 162).

Specimen 2 (Plate II, fig. 2)

Form: A markedly splayed-out lip is present on this everted rim. Lip thickness is 11 mm, and the neck thickness is 5 mm.

Decoration: Short, oblique cord-wrapped stick impressions extend down from the lip above a row of circular punctates which produce interior bosses. Very short vertical impressions done with the end of a cord-wrapped stick occasionally occur in the gap between the punctates. Below the punctates at least two horizontal rows of short obliques produced with the end of a cord-wrapped stick are to be found. The lip is decorated with vertical cord-wrapped stick impressions on top of which short encircling cord-wrapped stick impressions are present. The interior is plain. Although not recorded in MacNeish's typology, this specimen bears a close resemblance to the Manitoba Herringbone type (MacNeish, 1958:159).

Specimen 3 (Plate II, fig. 3)

Form: This everted rim has a sharply rolled rather than splayed-out lip. Lip thickness is 11 mm, and neck thickness is 6 mm.

Decoration: Directly below the lip, a horizontal row of shallow punctates produced with the end of a cord-wrapped stick is present. Below these punctates is another horizontal row of deep, ovate punctates which form bosses on the interior of the rim. An incised zigzag motif encircles the neck below the boss-producing punctates. Under this incised motif is a horizontal row of small rectanguloid punctates. The lip possesses vertical cord-wrapped stick impressions, and the interior rim is plain. Corresponding specimens are not described by MacNeish.

Specimen 4 (Plate II, fig. 4)

Form: The slightly everted rim on this specimen does not possess a splayed-out lip, and both the lip and neck thicknesses are 10 mm.

Decoration: Decoration is absent except for a horizontal row of circular punctates which produce interior bosses. The exterior and the flat lip of the rim have been impressed with a cord-wrapped paddle. Under MacNeish's typology this specimen would be classified as Cemetery Point Corded (MacNeish, 1958:162).

Specimen 5

Form: An everted rim with a splayed-out lip characterizes this specimen. Lip thickness is 9 mm, and neck thickness is 6 mm.

Decoration: Decoration on the exterior rim consists of short, oblique cord-wrapped stick impressions above at least four horizontal lines produced with a cord-wrapped stick. The lip is decorated with oblique cord-wrapped stick impressions, and the interior is plain. This specimen would appear to belong to the Manitoba Horizontal type (MacNeish, 1958:157–158).

Selkirk Rim Sherds

A single rim sherd, clearly assignable to the Selkirk focus, was recovered from Stratum I. Since MacNeish (1958: 67–70) has presented evidence that the Selkirk focus represents the prehistoric product of the Cree, the presence of this single sherd is significant.

Specimen 1 (Plate II, fig. 6)

Form: The specimen has an outflaring rim and a sharply constricted neck.

Decoration: Decoration is absent, although fabric impressions are present on the exterior and lip of the rim. In MacNeish's typology this specimen conforms to the Alexander Fabric-impressed pottery type (MacNeish, 1958:166–167).

BODY SHERDS

A total of 63 analysable body sherds were recovered from Stratum I. The smallness of the sample was, in part, due to the fissile nature of many of the sherds which tended to split and crumble. Five classes of sherds were established on the basis of exterior treatment. Plain surfaces were predominant although cord-wrapped paddle and smoothed-over cord surfaces had a fairly high representation. Where observable the majority of the cord-wrapped paddle impressions appeared to run vertically. The smoothed-over cord class refers to cord-impressed sherds where a final smoothing of the surface has obliterated the distinguishing features of the cord-wrapped paddle or fabric techniques. Sherds impressed with a twined fabric were in the minority. Usually a final smoothing resulted in the impressions being somewhat indistinct. The final minority class consisted of the linear punctated sherds which probably represent fragments from the Michigan derived vessels. Because of the low sample no attempt was made to separate shoulder and basal sherds although the former area of the vessel appears to be separable in a number of instances. Table 3 presents the frequencies of the five classes of body sherds found in the stratum and the range and mean thickness of each class. All sherds were grit-tempered and manufactured by the paddle and anvil technique.

TABLE 3
BODY SHERD DATA

Class	Thickness (mm)		f	%
	Range	Mean		
Plain	4–10	7.0	26	41.3
Cord Wrapped Paddle	5–8	6.0	14	22.2
Smoothed-over Cord	4–9	6.7	14	22.2
Twined Fabric	4–6	5.3	6	9.5
Linear Punctate	5–10	7.0	3	4.8
TOTALS			63	100.0

Gaming Disc (Plate II, fig. 14)

The only miscellaneous ceramic item was a pottery gaming disc. Careful grinding was present around the entire circumference of this cord-wrapped paddle-impressed sherd. The specimen has a diameter of 24 mm and a thickness of 7 mm. MacNeish (1958:175) reports the presence of clay discs with roughened surfaces in the Selkirk focus and suggests that they may have functioned as gaming discs.

LITHICS

PROJECTILE POINTS

Of the six projectile points recovered from Stratum I, three are notched and three are unnotched. All are made from flint with the exception of a single specimen manufactured from taconite, which was probably obtained from the Fort William – Port Arthur area. Two of the three unnotched triangular points are bifacially flaked; the remaining specimen possesses a point of percussion at one corner of the base and a relatively unmodified flake scar for one face. The blade edges of all three points are straight; two of the bases are convex, and one is concave. Length measurements for the two complete specimens are 27 mm and 30 mm, and base widths range from 16 mm to 20 mm with a mean of 18.3 mm. Thickness ranges from 4 mm to 5 mm with a mean of 4.3 mm. The three notched projectile points are bifacially flaked, although a substantial portion of the initial flake scar is present on one specimen. Notching tends to be more from the side than from the corner although a clear identification of these two techniques of notching is difficult. Two of the points possess convex blade edges, and one has straight blade edges. Two of the bases are convex, and one is straight. Length measurements for the two complete specimens are 24 mm and 26 mm, and the two base widths are both 13 mm. Thickness ranges from 3 mm to 5 mm with a mean of 4.0 mm. Examples of a triangular point and a notched triangular point can be seen on Plate II, figs. 8 and 9.

Scrapers

Twenty-three artifacts, which are inferred to have functioned as scrapers, were found in Stratum I. These tools fall into three general classes: end scrapers, side scrapers, and random flake scrapers.

End Scrapers

All twelve end scrapers possess a plain flake scar for the ventral surface with no evidence of retouch. Seven specimens have a clear detaching point of percussion at the extreme axis from the major scraping face, a characteristic which frequently results in scrapers having triangular outlines. Five specimens have scraping faces at one end and along two sides; four have scraping faces at one end and along one side; two have a scraping face only at the end, and one is too fragmentary to determine whether the edges possessed scraping faces. One of the specimens, with a scraping face at one end and along both sides, also has two adjacent concave depressions along one edge; these may have functioned as spoke shaves. Maximum length measurements from the major scraping face to the base on the ten complete specimens range from 16 mm to 34 mm with a mean of 24.3 mm. Maximum width measurements of the major scraping face range from 14 mm to 31 mm with a mean of 22.7 mm, and the height of the same scraping face ranges from 2 mm to 9 mm with a mean of 6.0 mm. A typical end scraper can be seen on Plate II, fig. 10.

Side Scrapers

Five of the six side scrapers were manufactured from random flakes with one long side representing the major scraping face. The sixth specimen, which was fragmentary, resembled a uniface blade and may have functioned as a side scraper. Besides this specimen, only the taconite scraper, having two additional retouched areas at both ends, possessed more than one scraping face. Length of the scraping edge ranged from 21 mm to 46 mm with a mean of 33.3 mm. The taconite specimen is illustrated on Plate II, fig. 11.

Random Flake Scrapers

Little can be said about these five artifacts other than that they are irregular flakes with short scraping edges. Three specimens have a single scraping edge, and two have two scraping edges. These edges range from 10 mm to 18 mm in length with a mean length of 15.0 mm.

Small Tools

On the basis of their minute size, eight tools recovered from Stratum I seem to deserve separate treatment from the scraper classification. Four specimens are triangular in shape with scraping edges running up both sides to the apex of the triangle. The scraping edges range in length from 9 mm to 22 mm with a mean of 13.4 mm. Basal widths range from 9 mm to 14 mm with a mean of 12 mm. An example of this group is illustrated on Plate II, fig. 12. Two other specimens were also trianguloid in outline, and the scraping edges were present on both sides but alternate faces and extended to the apex. The scraping edges were 9 mm and 15 mm in length, and base widths were 5 mm and 10 mm. One of the specimens possessed small side notches and is illustrated on Plate II, fig. 13. Of the remaining two specimens, one is rectangular in shape with scraping edges 20 mm and 22 mm long, and ends 9 mm and 12 mm wide; the other is slightly semilunar in shape with a scraping edge of 23 mm along the straight edge of the tool and a width of 10 mm. The preceding tools are all quiet thin, ranging from 1 mm to 3 mm in thickness with a mean of 2.4 mm. The size and form of these small artifacts would indicate that they possibly performed a special function. This function may have involved the finer work necessary on certain bone and wood items.

MISCELLANEOUS

Biface Blades

Only a tip fragment and a basal portion of two biface blades were found. The basal fragment was convex in outline.

Hammerstone

A single, small flint nodule hammerstone was found. Hammering is evident predominantly along one edge.

Stone Pipe

A vertically split half bowl fragment of a steatite pipe blank was recovered. In general form the pipe seemingly was approaching the Micmac variety. The interior diameter of the pipe is approximately 24 mm. Other measurements would not be meaningful as the pipe is unfinished.

BONE

Awls

Two fragments, possibly bone awls, were found in Stratum I. One of the fragments is plain, but the other, which has a roughly diamond-shaped cross-section, has two incised lines running the length of the artifact on one face. The ridge of bone between these lines, which is medially located, has been notched every 4 mm to 5 mm. It is possible that this latter fragment is part of a harpoonhead.

Beaver Incisor

A single small fragment of the occlusal end of a worked beaver incisor was recovered. There is evidence of grinding on the lingual face.

Bone Bangle

A bone bangle, which was probably fashioned from a moose phalange, was found, although accurate identification is difficult because of extensive surface grinding. A large opening is present at the proximal end, and a smaller opening occurs at the distal end (Plate II, fig. 24). The proximal and distal diameters were 22 mm and 9 mm respectively, and the length of the bangle was 57 mm.

Bone Bead

One large tubular bone bead measuring 65 mm in length and 10 mm in diameter was found (Plate II, fig. 17).

Decorated Bone

This rib fragment has a line of closely spaced dots, located medially for the length of the fragment. On the two edges of the same face, a closely spaced series of small notches are also present. Width and thickness measurements were 8 mm and 4 mm. The specimen is illustrated on Plate II, fig. 18.

Worked Scapula

The glenoid fossa of this deer or caribou scapula had been hollowed out, the medial border sawed(?)-off straight, and the spinous process broken away. Its function is unknown.

Bone Pendant (?)

This specimen consisted of a conical section of calcareous bone with a natural channel that could have been used for suspension. At the base of the specimen was a sharp indentation, perhaps produced with a knife blade. The pendant stood 21 mm high and had a basal diameter of 22 mm.

Wastage

Two fragments of bone wastage were found, one of which appeared to have been ground with an iron file.

NATIVE COPPER

Knife

The single native copper knife from Stratum I is illustrated on Plate II, fig. 25. It conforms to a general Late Woodland form of native copper knives. The overall length is 100 mm, the tang accounting for 44 mm of the total. The maximum blade width is 14 mm, and the thickness is 1 mm to 2 mm. Numerous laminating fissures are apparent, and a series of shallow notches occur at the ventral juncture of the blade and tang.

Fishhook

This specimen is inferred to be a fishhook, although it may represent an accidentally bent awl (Plate II, fig. 21). It has a flattened rectangular cross-section with a maximum length and width of 29 mm and 5 mm.

Wastage

Ten fragments or hammered nodules of native copper were also found in Stratum I.

SUMMARY

Stratum I makes a contribution to the limited knowledge presently available on the archaeological assemblages of Algonkian-speaking peoples of the Northeast. The remains from this historic stratum are almost certainly attributable to one of the bands of that broad mosaic of peoples called the Ojibwa. On the basis of the white trade goods and the surviving aboriginal material culture, an estimated age for the stratum would be the beginning of the 18th century. The evidence suggests that a mixture of three unrelated ceramic complexes were associated in this early historic Ojibwa settlement. Of the two major ceramic complexes, one is related to the Blackduck focus of northern Minnesota, southern Manitoba, and northwestern Northern Ontario; the other appears to have been derived from an assemblage centred in the State of Michigan. The former complex has been attributed to the Assiniboine or the Ojibwa. The third ceramic complex relates to the Selkirk focus which has been attributed to the Cree. This mixture of ceramic complexes possibly reflects both the greater mobility and cultural amalgamation of bands which resulted directly and indirectly from the fur trade. There is some evidence from the north shore of Lake Superior, however, to suggest that even during the late prehistoric period such associations of different ceramic complexes were not uncommon (Wright, 1963: 6). In general, the aboriginal material culture of Stratum I shows the impact of white trade. For example, gunflints outnumber projectile points; ceramics are quantitatively reduced when compared to similar prehistoric deposits; and the bone inventory is greatly weakened. The only major class of artifacts which does not appear to be effected is scrapers.

STRATUM II

Stratum II is prehistoric and is separated from the historic Stratum I by a sterile to semisterile lens of sand. On the basis of the sparseness of cultural debris and the light brown stain of the deposit, it is probable that the occupation was relatively short termed. There also appears to have been some slight mixture between Stratum II and strata I and III.

CERAMICS

Rim Sherds

The rim sherds from Stratum II may all be assigned to the Blackduck focus. In all, there are six vessels represented, although the rim fragments are unfortunately very small, thereby limiting the amount of information to be acquired. Following the system used in the examination of Stratum I, each rim sherd is described separately, and only one rim for each vessel is considered.

Specimen 1 (Plate III, fig. 1)

Form: This specimen has an everted rim and a splayed-out lip. Lip thickness is 10 mm, and thickness at the fracture line is 5 mm.

Decoration: Nearly vertical cord-wrapped stick impressions extend down from the lip above an undeterminable number of horizontal lines produced by the same technique. Between the first two horizontal lines are circular punctates which produce interior bosses. The lip is decorated with oblique cord-wrapped stick impressions. This rim is classifiable as Manitoba Horizontal (MacNeish, 1958:157–158).

Specimen 2 (Plate III, fig. 2)

Form: The rim appears to be everted, and the lip is splayed-out. Lip thickness and thickness at the fracture line are 10 mm and 5 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above a number of horizontal cord-wrapped stick impressions. Between the second and third horizontal line, circular punctates which produce interior bosses are present. The lip is decorated with oblique cord-wrapped stick impressions. As with the preceding specimen, this rim conforms to the Manitoba Horizontal pottery type.

Specimen 3 (Plate III, fig. 3)

Form: Although broken off close to the lip, this rim appears to be everted. The lip is not markedly splayed-out, being 7 mm thick as opposed to a thickness of 5 mm at the fracture line.

Decoration: A horizontal row of cord-wrapped stick punctates occurs directly below the lip and above circular punctates that produce interior bosses. One horizontal line of a cord-wrapped stick impression is just visible below the boss-producing punctates. Vertical combing covers the entire exterior of the rim from just below the cord-wrapped stick punctates. The lip is decorated with vertical cord-wrapped stick impressions. This rim is classifiable as Blackduck Brushed (MacNeish, 1958:159 and 162).

Specimen 4 (Plate III, fig. 4)

Form: This specimen has an everted rim and a rounded, thickened lip rather than the usual flat, splayed-out lip. Lip and neck thicknesses are 8 mm and 7 mm respectively.

Decoration: Decoration is absent except for a horizontal row of rectangular punctates that produces interior bosses. The exterior and the lip have been impressed with a cord-wrapped paddle. The rim conforms to the Cemetery Point Corded pottery type (MacNeish, 1958:162).

Specimen 5 (Plate III, fig. 5)

Form: The rim is everted and has a splayed-out lip. Lip thickness is 8 mm, and neck thickness is 5 mm.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above three horizontal cord-wrapped stick impressions. Below the horizontal motif is a line of oblique cord-wrapped stick impressions of indeterminable length. A line of circular punctates occurs between the first and second horizontal lines, but it does not raise interior bosses. Oblique cord-wrapped stick impressions are present on the lip. This rim may be assigned to the Manitoba Horizontal pottery type.

Specimen 6

Form: The concave exterior of this rim suggests that it was everted. The flat, splayed-out lip is 9 mm thick. The absence of a large portion of the interior rim made it impossible to take the neck thickness.

Decoration: The exterior rim is plain except for a line of circular punctates. It could not be determined whether these punctates produced interior bosses. The lip is decorated with oblique cord-wrapped stick impressions. This specimen does not conform to any of MacNeish's pottery types for southeast Manitoba.

Body Sherds

A total of 31 analysable body sherds were recovered from Stratum II. Four classes of sherd surface treatment were present, and three of these classes have been described from Stratum I. The only new class was represented by a single specimen and has been called 'punctated.' This sherd possesses numerous rectanguloid punctates which appear to have been arranged in a geometric motif. Table 4 presents the frequencies of the four classes of body sherds recovered from Stratum II as well as the range and mean thickness of each class. Examples of cord-wrapped paddle-impressed body sherds are given on Plate III, figs. 6, 7. Fig. 9 illustrates a smoothed-over cord shoulder sherd.

TABLE 4
BODY SHERD DATA

Class	Thickness (mm)		f	%
	Range	Mean		
Cord Wrapped Paddle	4–8	5.2	22	71.0
Smoothed-over Cord	5–11	7.5	6	19.4
Plain	5–6	5.5	2	6.4
Punctated	–	6.0	1	3.2
Totals			31	100.0

LITHICS

Projectile Points

Six projectile points were recovered from Stratum II. Four are triangular, one is notched, and one is pentagonal. Of the four triangular points, two which are bifacially flaked possess concave bases and straight blade edges (Plate III, fig. 10). The remaining two specimens have been retouched along the edges with a large portion of both faces being represented by a broad flake scar. The bases are unfinished being represented by a fracture lacking retouch. Blade edges are slightly convex (Plate III, fig. 11). All four triangular points are complete; length ranges from 24 mm to 35 mm with a mean of 29.0 mm, and basal width ranges from 15 mm to 20 mm with a mean of 17.8 mm. The maximum thickness of the four points ranges from 3 mm to 4 mm with a mean of 3.8 mm. The single notched point (Plate III, fig. 12) which has an impact fracture at the tip, has been reworked. The notching is irregular but conforms closer to side notching than to corner notching. The specimen is bifacially flaked and possesses convex blade edges and an irregular convex base. Length, maximum width, basal width, and thickness measurements are 22 mm, 16 mm, 12 mm, and 5 mm respectively. The pentagonal point which is bifacially flaked has convex edges and a slightly pointed base. Although the tip is missing, the total length would have been approximately 27 mm. Shoulder width and thickness are 17 mm and 3 mm respectively. The apex of the base is 3 mm below the axis of the shoulder.

Scrapers

Eight scrapers were found in Stratum II. Six specimens are classified as end scrapers and the remaining two specimens as side scrapers.

End Scrapers

All six end scrapers possess a plain flake scar for the ventral surface with no evidence of retouch. A clear bulb of percussion at the base is evident in three incidences. Four specimens have a scraping face at one end only; one specimen has a scraping face at the end and along both sides; and the remaining scraper has scraping faces at the end and along one side. All the end scrapers appear to be complete, and length measurements from the major scraping face to the base range from 19 mm to 46 mm with a mean of 28.7 mm. Maximum width measurements of the major scraping face range from 18 mm to 27 mm with a mean of 21.5 mm, and the height of the same scraping face ranges from 3 mm to 14 mm with a mean of 5.8 mm. Two end scrapers can be seen on Plate III, figs. 13 and 14.

Side Scrapers

One of the two side scrapers consists of a linear flake with a scraping edge 18 mm in length. The remaining specimen is triangular in shape with a convex base; it is unifacially flaked. One corner is missing, but the maximum length of the artifact and the length of its single complete scraping edge are 34 mm and 33 mm, respectively. It seems another scraping edge was present on the opposite side.

Small Tools

Three small tools, similar to those recovered from Stratum I, were present. One is triangular in shape with a convex base and possesses retouch on both sides and on the base to form scraping edges. This specimen measures 19 mm in length, 11 mm in basal width, and is 2 mm thick. It may possibly have functioned as a small projectile point. Another specimen is triangular in outline with a triangular cross-section. A scraping edge 22 mm long occurs along one side. Maximum length, basal width, and thickness measurements are 22 mm, 5 mm, and 3 mm, respectively. The final representative of this class of tool (Plate III, fig. 15) is four sided but irregular in shape. Retouch occurs along all edges of the flake. Maximum length, width, and thickness are 28 mm, 13 mm, and 2 mm, respectively.

Miscellaneous

Biface Blades

A single basal fragment of a biface blade was found. This fragment possesses a convex base and appears to have had straight sides. Base width is 28 mm, and thickness is 9 mm.

Catlinite

Three fragments of ground catlinite, which probably represent fragments of raw material for pipe manufacture, were found. One of the block fragments is illustrated on Plate III, fig. 8. The stone is quite soft and has a strong pink colour. One fragment has a semicircular depression with a diameter of 4 mm ground into a flattened edge.

Polishing Stones

Two pebbles have been regarded as some form of polishing tool. Both stones are natural except for one slightly flattened face. Also both pebbles are of hard and naturally smooth surface rock. This natural smoothness suggests that the tools would be of relatively little use as abraders. One specimen possesses slight evidence of hammering at one corner. An example of a polishing stone is illustrated on Plate III, fig. 16.

BONE

Awls

Two tips of awls were found in Stratum II. On one bone awl the grinding had exposed the neural canal along one edge. The specimen has a rectangular cross-section except at the tip where the cross-section is circular. Small, closely spaced notches occur along all four corners (Plate III, fig. 21). The other tip fragment, of antler, might possibly be a long barb fragment from a harpoon rather than an awl tip.

Beaver Incisor

A single worked beaver incisor was recovered from the stratum. The occlusal end is blunted, and the lingual face bears abundant evidence of grinding. This specimen (Plate III, fig. 20) has also split vertically, but there is no evidence of grinding along the split edge.

Harpoon Head

A long section of a unilaterally barbed antler harpoonhead was found (Plate III, fig. 19) lacking its basal portion. The only other possible harpoonhead fragment appears to represent a basal fragment and may be part of the preceding specimen. This specimen (Plate III, fig. 22), also of antler, has been broken obliquely through the inferred line hole. In cross-section both fragments are a flattened ovate acuminate.

Worked Turtle Shell

Two fragments of worked turtle shell carapace were found. Both fragments have bi-convexly drilled holes (Plate III, fig. 23). There is no other evidence of artificial modification.

Spatula

This flattened fragment of bone with a broad pointed end may have functioned as a spatula.

Wastage

Three fragments of bone showing evidence of scoring and grinding are regarded as wastage.

NATIVE COPPER

Bar

The single item of native copper manufacture from Stratum II is a bar 36 mm long with a rectangular cross-section 4 mm by 2 mm (Plate III, fig. 18).

SHELL

Anculosa Bead

A single anculosa bead (Plate III, fig. 17), ground flat on its ventral face, was found in the stratum. The specimen must have originally come from the southeastern United States. The preceding information was obtained from

Dr. Arthur Clarke of the Natural History Branch, National Museum of Canada.

SUMMARY

Stratum II is a thin, homogenous occupation attributable to the Blackduck focus. As will be seen in the examination of Stratum III, the remains from strata II and III are very similar. This suggests that the two occupations are relatively close to one another in time. An estimated date for the Stratum II occupation is somewhere in the 11th century. Such an estimate, however, is strictly a calculated guess, based upon seriational and typological similarities of Stratum II to Stratum III.

STRATUM III

Stratum III represents the major prehistoric occupation level of the site. As can be seen on Plate I, the stratum occurs as a thick, dense black deposit, very rich in village debris. A radiocarbon date of A.D. 962 ± 80 (GSC-85) from the stratum suggests the occupation's position in time.

CERAMICS

Rim Sherds

The rim sherds from Stratum III belong to two separate ceramic complexes. Sherds attributable to the Blackduck focus predominate, and a few rim sherds representative of the Pickering branch of the Ontario Iroquois Tradition are present (Wright, MS.). This association between the Blackduck focus and early Pickering branch was also present at the stratified Frank Bay Site on Lake Nipissing (Ridley, 1954). For example, on Figure 19 of the Frank Bay report illustrating Primary Transitional Stratum rim sherds, the writer regards specimens *a*, *b*, *d*, and *f* as examples of early Pickering branch rims, and specimen *h* as a very probable Blackduck sherd. In the following stratum at the same site (Frank Bay Transitional Stratum), which pertains to a later period of the Pickering Branch, specimen *i* on Figure 20 is regarded as a Blackduck focus rim, and the remaining specimens are regarded as Pickering branch sherds. In the Primary Transitional and Frank Bay Transitional strata of the Frank Bay Site, however, the Pickering branch ceramics predominate over the Blackduck focus ceramics. It thus appears that the Blackduck focus and the early Pickering branch were coeval and that their ranges of influence overlapped. A radiocarbon date of A.D. 1127 ± 70 (S-108) for the Miller site (McCallum and Wittenburg, 1962), an early Pickering branch village site near Toronto (Kenyon, 1959; 1960*a*), supports the radiocarbon results from Stratum III, since the Pickering branch rims from this stratum and from the Primary Transitional Stratum of the Frank Bay Site appear to be slightly earlier than the sherds from the Miller site. As with the previous two strata, only one representative sherd of a vessel will be examined.

Blackduck Rim Sherds

The majority of these sherds are classifiable under MacNeish's typology (1958) for the Manitoba focus. The few specimens which do not conform to the established typology are assigned to the Blackduck focus on the basis of major attribute characteristics.

Blackduck Brushed (MacNeish, 1958:159, 162)

Specimen 1 (Plate IV, fig. 1)

Form: An everted rim with a slightly splayed-out flat lip characterizes this rim. Lip thickness and neck thickness are 10 mm and 7 mm respectively.

Decoration: Decoration consists of slightly oblique cord-wrapped stick impressions extending down from the lip above two horizontal lines of cord-wrapped stick impressions. Between the two horizontal lines are circular punctates which raise interior bosses. Below the obliques and superimposed over the horizontal lines and punctates is vertical combing. Experimentation demonstrates that the combing effect can be achieved by simply dragging the cord-wrapped stick over the wet clay. The lip is decorated with a zigzag motif produced with a cord-wrapped stick. Vertical combing is superimposed over the lip motif. The interior rim is covered with horizontal combing.

Specimen 2

Form: The rim is everted and has a splayed-out lip. Lip and neck thicknesses are 13 mm and 6 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above a line of circular punctates which produce interior bosses. Vertical combing covers the neck from the lip down. Near the shoulder of the vessel cord-wrapped paddle impressions are visible. The lip is decorated with oblique cord-wrapped stick impressions as is the interior of the vessel directly below the lip.

Specimen 3

Form: This rim is everted and has a splayed-out lip. Lip and neck thicknesses are 10 mm and 5 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above a horizontal line of circular punctates which produce interior bosses. Vertical combing extends down from the obliques and covers the neck of the vessel. Oblique cord-wrapped stick impressions cover the lip.

Specimen 4

Form: An everted rim and a splayed-out lip characterize this sherd. Lip thickness is 12 mm as opposed to a neck thickness of 8 mm.

Decoration: A zigzag motif executed with a cord-wrapped stick occurs below the lip and above circular punctates which raise interior bosses. Vertical combing extends down from the punctates to cover the neck. The lip is decorated with oblique cord-wrapped stick impressions. Horizontal combing covers the interior of the rim.

Specimen 5

Form: This specimen has a slightly everted rim and a splayed-out lip. Lip and neck thicknesses are 9 mm and 5 mm respectively.

Decoration: Short, oblique cord-wrapped stick impressions extend down from the lip above a row of circular punctates which raise interior bosses. Vertical combing is present below the punctates. Vertical cord-wrapped stick impressions cover the lip.

Specimen 6

Form: The rim is everted, and the lip is splayed-out. Lip and neck thicknesses are 11 mm and 5 mm respectively.

Decoration: Short oblique to vertical cord-wrapped stick impressions extend down from the lip above a row of circular punctates which produce interior bosses. Vertical combing is present below the punctates. The exterior and interior corners of the lip are notched with a straight-edged tool.

Specimen 7

Form: The rim is everted and the lip is splayed-out. Lip and neck thicknesses are 11 mm and 6 mm respectively.

Decoration: Vertical cord-wrapped stick impressions extend down from the lip above four horizontal rows of cord-wrapped stick impressions. A row of circular punctates, which raise interior bosses, is present between the first and second horizontal row. Vertical combing extends down from the lip edge to the shoulder of the vessel. Crisscross cord-wrapped stick impressions occur on the lip.

Specimen 8

Form: The rim is everted, and the lip is slightly splayed-out. Lip and neck thicknesses are 12 mm and 9 mm respectively.

Decoration: Short oblique cord-wrapped stick impressions extend down from the lip above two continuous horizontal lines of cord-wrapped stick impressions. Below these lines are at least four horizontal lines of discontinuous cord-wrapped stick impressions. These short, horizontal cord-wrapped stick impressions are approximately 18 mm long and are separated from one another on the horizontal by 5 mm. They also occur on the same vertical plane and in this respect resemble plats. Circular punctates, which just barely raise interior bosses, are present between the first and second horizontal lines. Vertical brushing extends down from the lip edge to cover the entire exterior motif. The lip is decorated with oblique cord-wrapped stick impressions, and the interior rim possesses sporadic areas of horizontal combing.

Specimen 9

Form: The rim is everted, and the flat lip is slightly splayed-out. Lip and neck thicknesses are 10 mm and 9 mm respectively.

Decoration: Short, oblique cord-wrapped stick impressions extend down from the lip above four horizontal rows of cord-wrapped stick impressions. A row of short, cord-wrapped stick punctates occurs under the horizontals. Circular punctates which raise interior bosses occur between the first and second horizontal lines. Vertical combing extends down from the lip edge to the cord-wrapped stick punctates. Lip decoration consists of oblique cord-wrapped stick impressions with dragging between each impression to produce oblique combing.

Specimen 10

Form: An everted rim and a splayed-out lip characterize this specimen. Lip and neck thicknesses are 11 mm and 7 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least six horizontal lines of cord-wrapped stick impressions.

Ovate acuminate punctates, which raise interior bosses, occur between the first and second horizontal lines. Vertical combing covers the exterior rim from the lip edge down. Oblique cord-wrapped stick impressions occur on the lip, and the interior rim possesses horizontal combing.

Specimen 11

Form: The rim is slightly everted and has a splayed-out lip. Lip and neck thicknesses are 11 mm and 6 mm respectively.

Decoration: Vertical cord-wrapped stick impressions extend down from the lip above at least two horizontal lines of cord-wrapped stick impressions. Circular punctates, which raise interior bosses, occur between the two horizontal lines. Vertical combing covers the entire exterior surface of the rim. The lip is decorated with a crisscross motif executed with a cord-wrapped stick.

Specimen 12

Form: An everted rim and splayed-out lip characterize this specimen. Lip and neck thicknesses are 9 mm and 4 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least five horizontal lines of cord-wrapped stick impressions. Irregular punctates, which produce incipient interior bosses, occur between the first and second horizontal lines. Vertical combing covers the exterior rim. The lip is decorated with a crisscross motif executed by the cord-wrapped stick technique. Horizontal combing is present on the interior rim.

Specimen 13

Form: An everted rim and splayed-out lip characterize this specimen. Lip and neck thicknesses are 11 mm and 5 mm respectively.

Decoration: Vertical cord-wrapped stick impressions extend down from the lip above at least four horizontal lines executed by the same technique. Circular punctates, which raise interior bosses, occur between the first and second horizontal lines. Vertical combing covers the exterior rim. The lip is decorated with a crisscross motif executed with a cord-wrapped stick.

Specimen 14

Form: The rim is everted, but nothing can be said about the lip since the interior portion of the rim is missing.

Decoration: Short, cord-wrapped stick obliques occur below the lip and above a row of circular punctates which raise interior bosses. The punctates are above at least three horizontal lines of cord-wrapped stick impressions. Vertical combing covers the exterior. The surviving edge of the lip indicates that oblique cord-wrapped stick impressions were present.

Manitoba Horizontal (MacNeish, 1958:157–158)

Specimen 1 (Plate IV, fig. 2)

Form: The rim is everted and the lip is splayed-out. Lip and neck thicknesses are 10 mm and 5 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least five horizontal lines of cord-wrapped stick impressions. Circular punctates, which raise interior bosses, occur between the first and second horizontal lines. The lip is decorated with oblique cord-wrapped stick impressions which have been slightly dragged to produce the combing motif.

Specimen 2

Form: The rim is everted, and the lip is markedly splayed-out. Lip and neck thicknesses are 12 mm and 5 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least four horizontal lines of cord-wrapped stick impressions. Circular punctates, which produce interior bosses, occur between the first and second horizontal lines. The lip is decorated with oblique cord-wrapped stick impressions.

Specimen 3

Form: The rim is straight, and the lip is splayed-out. Lip and neck thicknesses are 9 mm and 5 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least five horizontal lines of cord-wrapped stick impressions. Circular punctates, which raise interior bosses, occur between, or on, the second and third horizontal lines. Oblique cord-wrapped stick impressions are present on the lip.

Specimen 4

Form: The rim is slightly everted, and the lip is splayed-out, but as the outside edge is destroyed no measurements are possible.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above at least two horizontal lines of cord-wrapped stick impressions. Circular punctates, which raise interior bosses, are present between the first and second horizontal lines. Lip decoration appears to be absent.

Cemetery Point Corded (MacNeish, 1958:162)

Specimen 1

Form: The rim is everted, and the flat lip is not splayed-out. Lip and neck thicknesses are 7 mm and 6 mm respectively.

Decoration: Decoration of the exterior rim and bossing are absent. Vertical cord-wrapped paddle impressions, however, occur on the exterior, and oblique impressions with the same implement are present on the lip.

Specimen 2

Form: The rim is sharply everted, and the lip is more bent over than splayed-out. Since the interior portion of the rim is missing, no measurements are possible.

Decoration: The exterior of the rim has been impressed vertically with a cord-wrapped paddle. A row of circular punctates, which produce interior bosses, is present. The lip is vertically impressed with a cord-wrapped paddle.

Specimen 3

Form: The rim is everted, and the lip is rounded rather than flat and splayed-out. Lip and neck thicknesses are both 10 mm.

Decoration: Decoration is absent except for a row of circular punctates that produces interior bosses. The exterior of the rim is covered with vertical cord-wrapped paddle impressions, and the two corners of the lip have been notched with the same implement.

Miscellaneous

The following four specimens are not to be found in MacNeish's rim sherd typology for the Manitoba and Selkirk foci of southeast Manitoba. They do, however, appear to be assignable to the Blackduck focus. It is restated that the Blackduck and Manitoba foci are treated in this paper as synonymous terms.

Specimen 1 (Plate IV, fig. 3)

Form: The rim is sharply everted, and the lip is markedly splayed-out. Lip and neck thicknesses are 14 mm and 6 mm respectively.

Decoration: Oblique cord-wrapped stick impressions extend down from the lip above three horizontal lines produced with a cord-wrapped paddle whose tightly twisted cords were separated from one another by 3 mm to 5 mm. Below the horizontal motif, long oblique impressions, produced with the same type of cord-wrapped paddle, are present. Rectangular punctates are located between the first and second horizontal lines but do not produce interior bosses. The lip has an encircling twisted cord impression superimposed over oblique cord-wrapped stick impressions; the exterior corner has been apparently notched with a cord-wrapped paddle. The interior of the rim is decorated with short, oblique cord-wrapped stick impressions.

Specimen 2 (Plate IV, fig. 4)

Form: The rim is sharply everted, and the lip is rounded. Lip and neck thicknesses are 8 mm and 7 mm respectively.

Decoration: Decoration consists of short, oblique cord-wrapped stick impressions below the lip, and oblique impressions with the same tool on the lip.

Specimen 3 (Plate IV, fig. 5)

Form: The rim is everted, and the lip is markedly splayed-out. Lip and neck thicknesses are 17 mm and 8 mm respectively.

Decoration: The exterior edge of the lip, the lip proper, and the interior rim have been clearly impressed with a large twined fabric. On the interior the fabric has left a horizontal impression, whereas on the lip and the lip edge the impressions are vertical.

Specimen 4

Form: The rim is everted, and the lip is only very slightly expanded. Lip and neck measurements are 8 mm and 6 mm respectively.

Decoration: Short punctates executed with a cord-wrapped stick occur below the lip. Approximately 8 mm below these punctates is a row of irregular crescent punctates which raise slight interior bosses. The vessel surface below the neck is impressed vertically with a cord-wrapped paddle. Lip decoration consists of vertical impressions of a cord-wrapped paddle.

Pickering Branch Rim Sherds

Specimen 1 (Plate IV, fig. 7)

Form: The rim is incipiently collared with a concave interior, and the lip is flat and bevelled downward towards the exterior. On a rim fragment of the same vessel, which is not illustrated, an incipient pointed castellation is present.

Decoration: Decoration consists of an oblique row of dentate stamp above a line of closely spaced bosses which are separated from one another by short dentate stamp punctates. Below the exterior bosses are two parallel rows of oblique dentate stamp. The lip is decorated with vertical dentate stamp impressions which have been dragged laterally, partially duplicating the combing motif. On the interior a row of oblique dentate stamp extends down from the lip above the closely spaced row of oblique diamond-shaped punctates which produced the exterior bosses. Two rim fragments of the same vessel were recovered with one coming from Stratum III and the other from Stratum I.

Specimen 2

Form: The rim is incipiently collared with a concave interior and a constricted neck.

Decoration: A row of fine, shallow toothed dentate stamp obliques occur below the flat lip above two rows of closely spaced bosses. The neck is smooth. Lip decoration consists of oblique impressions made with the same toothed tool. On the interior a short oblique row of dentate stamp occurs above the two rows of oblique elliptical punctates which produced the exterior bosses. This sherd came from Stratum I, but on the basis of its attributes and the available knowledge on the Pickering branch it is assigned to Stratum III.

Specimen 3 (Plate IV, fig. 6)

This specimen appears to represent a ceramic miscegenation, if such a concept is permissible. It combines the form and bossing attributes of the Blackduck focus with the dentate stamp technique of the early Pickering branch. A number of rims from the vessel were obtained from both strata I and III in one locality of the excavation.

Form: The rim is markedly everted, and the lip is splayed-out. Lip and neck thicknesses are 12 mm and 7 mm respectively.

Decoration: Oblique dentate stamp extends down from the lip above a row of circular punctates which raise interior bosses. Under the punctates are four horizontal lines of dentate stamp. The lip is decorated with oblique dentate stamp. If the dentate stamp technique were substituted for the cord-wrapped stick technique this sherd would be classifiable as Manitoba Horizontal.

Specimen 4

This sherd is very fragmentary, consisting of a small portion of the upper rim.

Form: The exterior is convex, and the interior is concave suggesting that the vessel was probably collared.

Decoration: Only a small portion of the decoration is visible, and this consists of oblique heavy dentate stamp running down from the lip and the same oblique motif and technique on the flat lip.

Body Sherds

A total of 275 analysable body sherds were recovered from Stratum III.

The cord-wrapped paddle technique of surface treatment dominated the sample; the smoothed-over cord technique, however, also had a substantial representation. Though difficult to determine accurately, the majority in this last category would appear to represent smoothed-over cord-wrapped paddle sherds. Table 5 gives the frequencies of the five classes of body sherd treatment found in the stratum and the range and mean thickness of each class.

TABLE 5
BODY SHERD DATA

Class	Thickness (mm)		f	%
	Range	Mean		
Cord-Wrapped Paddle	4–8	5.3	195	70.9
Smoothed-over Cord	4–9	6.2	65	23.6
Plain	4–9	6.9	9	3.3
Twined Fabric	4–8	5.5	4	1.5
Combed	6–7	6.5	2	.7
TOTALS			275	100.0

Miscellaneous

Four rim fragments of what are regarded as children's vessels, were found in Stratum III. There is a possibility that one specimen represents a lip portion of a pipe bowl, although the object is too fragmentary for certainty. Three specimens are plain, two lack temper, and the third possesses an abundance of grit temper. The two temperless specimens also have everted rims, and the tempered specimen is straight-sided. A single decorated specimen, lacking temper, possesses a horizontal line of cord-wrapped stick impressions below the lip and, above, at least two horizontal rows of circular punctates which do not raise interior bosses. The slightly everted lip is decorated with oblique cord-wrapped stick impressions. These specimens, with the possible exception of one, are regarded as the work of young girls learning the ceramic art.

LITHICS

PROJECTILE POINTS

Stratum III was the only stratum in the Upper Beach sequence which produced a significant number of projectile points. These points fall into three general classes: trianguloid, notched, and pentagonal.

Trianguloid

Fourteen specimens or 63.6 per cent of the total recovered projectile points are classed as trianguloid (Plate IV, fig. 8). Two points are bifacially retouched, four are unifacially retouched, and the remainder are predominantly retouched along the edges with little modification to the original flake surface on both faces. Blade edges are convex except for two specimens which possess one convex edge and one straight edge. Basal configurations are seven straight, six convex, and one concave. All the trianguloid points are complete, and length measurements range from 19 mm to 33 mm with a mean of 25.5 mm. Base width ranges from 11 mm to 24 mm with a mean of 17.7 mm. Thickness ranges from 3 mm to 6 mm with a mean of 4.0 mm.

Notched

Seven projectile points, or 31.8 per cent of the total sample, were notched. As with the previous two strata the form of notching is usually difficult to determine with the exception of that in the specimen illustrated on Plate IV, fig. 9, which represents a clear case of side-notching. Of the six specimens where the notches are intact, four are side notched, one is corner notched, and one has a corner notch and a side notch. One point is bifacially retouched; two are unifacially retouched, one is indeterminable; and the remaining three points are predominantly retouched along the edges with only minor modification to the original flake surface on both faces. Blade edge configurations on the six specimens where the attribute is observable are all convex. Basal configurations consist of three convex, two straight, one concave, and one indeterminable. Five specimens are complete, and length measurements range from 22 mm to 37 mm with a mean of 27.4 mm. Base width on six specimens ranges from 11 mm to 16 mm with a mean of 13.7 mm, and shoulder width for six specimens ranges from 15 mm to 19 mm with a mean of 17.5 mm. Thickness ranges from 3 mm to 6 mm with a mean of 4.6 mm.

Pentagonal

A single projectile point, or 4.6 per cent of the total sample, was placed in this class. The point is retouched along the edges with little modification of the flake scar faces on both sides. Though the blade edges are convex, the base edges are straight and terminate in a point. The length, shoulder width, base length, and thickness measurements are 26 mm, 16 mm, 5 mm, and 4 mm.

SCRAPERS

The 24 scrapers found in Stratum III were segregated as follows: end scrapers, 14; random flake scrapers, 7; and side scrapers, 3.

End Scrapers

All fourteen end scrapers possess a plain flake scar for the ventral surface with little or no evidence of retouch. Half the specimens have a clear bulb of percussion at the extreme axis from the major scraping face. Usually the point of percussion represents the apex of the general triangular outline of the scraper. Eight specimens have a scraping face at one end only; three have a scraping face at one end and both sides; two have a scraping face at one end and one side; and one scraper is too fragmentary to determine the number of scraping faces. Nine of the scrapers are complete, and length measurements range from 21 mm to 28 mm with a mean of 25.1 mm. Maximum width measurements of the major scraping face range from 15 mm to 27 mm with a mean of 20.3 mm, and the height of the same scraping face ranges from 2 mm to 9 mm with a mean of 5.6 mm. A typical end scraper can be seen on Plate IV, fig. 10.

Random Flake Scrapers

Five of the seven random flake scrapers possess a single scraping edge, and the remaining two specimens have scraping faces along two edges. These edges range from 12 mm to 30 mm in length with a mean length of 16.9 mm.

Except for a single quartz specimen all the scrapers are manufactured from flint.

Side Scrapers

Only three scrapers with the scraping edges occurring along one or two sides of a straight-edged flake were recovered. One flake is triangular in outline with the scraping edges running along two sides to the apex of the triangle. Another flake is rectanguloid with scraping edges along both sides of the long axis of the flake. Another flake is also rectanguloid in outline with a single scraping face along one long edge. The lengths of the scraping edges range from 15 mm to 42 mm with a mean of 29.4 mm.

Small Tools

Four artifacts, which are regarded as small, specialized tools, were found. The only extensively fashioned specimen is squarish in form with a scraping face around the entire edge of the flake. At one end, a small projection that may have functioned as a graver is present (Plate IV, fig. 11). Exclusive of the projection, the specimen measures 17 mm by 15 mm and is 2 mm thick. The projection is 4 mm long. The remaining three specimens consist of random flakes with one edge modified. Two specimens are chipped along one edge to form the usual scraping face. The maximum lengths of these faces are 14 mm and 16 mm. One specimen has bifacial retouch on one edge which is 14 mm in length. It would appear that the function of these tools would be to do the finer work necessary on items of bone, wood, leather and so on.

Miscellaneous

Biface Blades

Two complete biface blades, one base, and one tip fragment were recovered. Both of the complete specimens are irregularly ovate in shape, although one has an unworked projection extending from an edge. The specimen illustrated on Plate IV, fig. 12 is 60 mm long, 35 mm in maximum width, and 11 mm thick. The other complete specimen consists of a flat flake with bifacial chipping restricted to the edges. It measures 45 mm in length, 20 mm in width (exclusive of the projection), and is 4 mm thick. The base fragment represents a corner of a straight-based blade.

Flake Blade

A single flake blade (Plate IV, fig. 13) with a flat triangular cross-section was found. It measures 49 mm in length, 14 mm in maximum width, and 4 mm in thickness. Minute flaking produced by use is visible along one edge. The form of this specimen is regarded as being fortuitous and not as evidence of a core-blade tradition at the site.

Drill (?)

This triangular flake possesses bifacial retouch along two sides which converge to the apex of the triangle. It may be that the specimen represents a crude projectile point rather than a drill.

Polishing Stones

Three pebbles appear to have been used as polishers. One specimen possesses evidence of use on both faces (Plate IV, fig. 17), and the remaining specimens have evidence of use on a single face. There is no further modification to these hard igneous pebbles, other than the polishing facet or facets. As the rocks are naturally smooth surfaced, there would be relatively little abrading action.

Stone Pipes

One nearly complete steatite pipe and a bowl fragment of a stone pipe were found in Stratum III. The steatite specimen (Plate IV, fig. 15) is quite crude with numerous cutting facets being observable. At one end of the small rectangular, almost square bowl, is a rectangular projection with a tapered perforation to receive the stem. At the other end of the bowl is a flattened, wedge-shaped projection. All that can be said about the other pipe fragment is that it is a small portion of a well finished pipe bowl manufactured from hard stone and that the lip is notched.

Slot Abraders

Two fragments of sandstone slot abraders were found. Both of these specimens which are broken in half (Plate IV, fig. 16) have a single longitudinal groove along one face. Cross-sections are rectanguloid and measure 31 mm by 18 mm, and 36 mm by 11 mm.

Problematical Ground Stone

Two problematical ground stone objects were found. One specimen of ground schistose (Plate IV, fig. 14) has split vertically along one face, but sufficient remains to see that the cross-section is rectangular. No function can be inferred for this object. The other specimen is manufactured from red slate and has broken longitudinally. Evidence of bevelling at both ends suggests that the object may have functioned as a tool for hide working. An extremely high polish is observable along the intact side.

Graphite Paintstone

A single nodule of graphite is thought to have functioned as a paintstone.

BONE

Awls

Two nearly complete awls and three fragmentary awls were recovered from Stratum III. The bone specimen illustrated on Plate IV, fig. 21 has a circular cross-section at the tip which becomes a flat rectangular cross-section toward the base. The other nearly complete awl is manufactured from antler and has a circular cross-section for the major portion of its length but tapers sharply to a wedge-shaped base. A single decorated specimen is manufactured from antler. Its cross-section is roughly diamond shaped, and a series of notches spaced approximately every 2 mm, occur along the two sides (Plate IV, fig. 20). The remaining two specimens are too fragmentary to give any pertinent data.

Beaver Incisors

The fourteen worked beaver incisors from the stratum may be separated into four varieties: ground on the lingual face at the occlusal end of the incisor (Plate IV, fig. 24); ground on the lingual face at the occlusal and root ends of the incisor; ground along the entire lingual face from occlusal edge to root (Plate IV, fig. 22); and ground on the lingual face at the occlusal edge with a large portion of the upper lingual edge cut or ground away (Plate IV, fig. 23). In terms of frequencies, there are five specimens with grinding at one end, four specimens modified at both ends, three incisors with the entire lingual face ground, and two specimens with a step cut into the lingual face.

Decorated Bone

Three fragments of decorated bone were recovered. Two of these fragments appear to have been part of a single specimen, one is illustrated on Plate IV, fig. 19. Both fragments are pieces of split long bone with two longitudinally incised lines along the edges of which a series of small notches occur. A lateral incised line terminates the longitudinal line, and the decorative motif occurs on only one face of both fragments. The remaining specimen consists of a rib fragment with the interior surface ground flat, and the natural convex exterior decorated with a medial line of shallow, oblique incisions.

Worked Turtle Shell

Two fragments of turtle carapace and one fragment of plastron possess evidence of modification. The two carapace fragments have been carefully ground on the interior and may represent portions of a turtle shell bowl (Plate IV, fig. 26). The plastron fragment lacks similar evidence of grinding but possesses two biconvexly drilled holes, and it may represent a fragment of a turtle shell rattle or, possibly, a pendant.

Harpoonhead

One antler harpoonhead, lacking a single barb, and a large antler barb from another harpoon were recovered. The complete specimen illustrated on Plate IV, fig. 25 is unilaterally barbed and originally had four barbs. A biconvexly drilled line hole occurs a short distance below the basal barb. In cross-section the harpoonhead is markedly wedge-shaped with the barb edges representing the apex of the wedge. The length measurement is 125 mm, and the dorsal thickness (barbs regarded as being located along the ventral edge) at mid-point is 7 mm.

Femoral Head Abraders (?)

Two moose femoral heads had been split in half, and the calcareous bone thus exposed was apparently used for abrading purposes (Plate IV, fig. 18).

Wastage

Two fragments of slotted long bone are regarded as wastage.

Fishhook Barb (?)

A small fragment of bone 29 mm long, which was ground to a sharp point, is regarded as a possible barb from a composite hook.

Beaver Mandible Scraper (?)

A beaver mandible, broken obliquely through the ramus with the condoyle and coronoid process intact, is regarded as a possible scraper. Grinding along the straight break has produced a bevelled edge.

NATIVE COPPER

Awls

Two copper awls, both possessing a single point, were recovered. The large specimen illustrated on Plate IV, fig. 29, has a roughly square cross-section except near the tip where the cross-section becomes circular. In length the awl is 93 mm; and the lower two-thirds of the specimen is approximately 4 mm thick. The smaller specimen which is very crudely fashioned has a flat rectangular cross-section. It is 30 mm long, 3 mm wide at the base, and 1 mm thick. There is a very good possibility that this specimen served some other function than that of an awl.

Pendant

The specimen illustrated on Plate IV, fig. 28 is thought to have functioned as a pendant or some other decorative device. It is roughly circular in outline, and the edges are bent up to form a bowl-shape. A small perforation near the edge may have been a suspension hole. The specimen has a diameter of approximately 27 mm, is .5 mm thick, and has a depth of 7 mm from lip edges to the central depression.

Cylindrical Bead

A single cylindrical bead (Plate IV, fig. 27), 21 mm in length and 6 mm in diameter, was recovered.

Bar

A short copper bar 22 mm in length with a rectangular cross-section 4 mm by 2 mm was found.

Wastage

Nine fragments and flattened-out nuggets of native copper were recovered from Stratum III and are regarded as waste products.

SUMMARY

Stratum III, as the major occupation of the Upper Beach area, contained a great deal of information pertinent to Late Woodland developments along the north shore of Lake Superior. A radiocarbon estimate has also allowed the temporal placement of the assemblage found in the stratum. Of particular interest is the direct association of Blackduck focus ceramics and early Pickering branch ceramics. The spatial and temporal overlap of the two complexes is demonstrated by association, and this association is further strengthened by the situation seen in the Primary Transitional and Frank Bay Transitional strata of the Frank Bay site on Lake Nipissing. Further, the radiocarbon estimate from Stratum III of the Pic River Site is in essential agreement with radiocarbon estimates from the Pickering branch in Southern Ontario. Since the Blackduck focus is dominant at the Pic River Site and the Pickering branch is dominant at the Frank Bay site, the border between the two 10th-century complexes must lie somewhere within the 350 miles that separate the two sites. There also exists the possibility of a third intervening complex as suggested by a radiocarbon date of A.D. 1100 ± 60 (S-170) for a Michigan-derived ceramic complex found at the stratified Michipicoten site. The sherds of this complex are unrelated to those found in the historic Stratum I of the Pic River Site. Thus, one of the major contributions of

Stratum III is the addition to our knowledge of the geographic distribution of two unrelated ceramic assemblages during a restricted period in time. Future excavation of stratified sites similar to Frank Bay, Pic River, Michipicoten, and Juntunen, in addition to a number of radiocarbon readings from pertinent components should allow a relatively accurate geographic delineation of the various Late Woodland assemblages during certain time periods.

CONCLUSIONS

A time depth of over 700 years is represented by the three strata of the Upper Beach area. Despite this considerable time range there are certain close correspondences between the assemblages recovered from the three strata which are felt to reflect the cultural conservatism of the occupants of this portion of the north shore of Lake Superior. Elements common to all strata are general and specific ceramic characteristics, projectile points, scrapers, small stone tools,[1] and worked beaver incisor varieties, and certain general correspondences seen in the lithic, bone, and copper assemblages. It is, in particular, the abundance of specific correspondences which are regarded as evidence for cultural continuity through time.

Ceramics have been most explicit in illustrating the degree of continuity between strata. Throughout the entire sequence, pottery types attributable to the Blackduck focus are to be found. Even the ceramic discontinuity expressed by the presence of early Pickering branch rims in Stratum III and Michigan-derived rims and a Selkirk focus rim in Stratum I illustrates the continuity of ceramic mixture in these two strata. The association of two or more ceramic complexes in a single occupation level appears to be a general characteristic of Late Woodland sites along the north shore of Lake Superior and is expressive, perhaps, of the mobility of the sparse nomadic population that occupied the area. Table 6 illustrates the mixture of ceramic complexes and the continuity of the Blackduck focus ceramics within the three strata.

TABLE 6

SUMMARY OF RIM TYPES FOUND IN STRATA I TO III

Rim Type or Class	Stratum I	Stratum II	Stratum III
Michigan complex	8 (57.1)	—	—
Blackduck Focus: Unclassified	2 (14.3)	1 (16.7)	4 (13.8)
Blackduck Brushed	1 (7.1)	1 (16.7)	14 (48.3)
Manitoba Horizontal	1 (7.1)	3 (50.0)	4 (13.8)
Cemetery Point Corded	1 (7.1)	1 (16.7)	3 (10.3)
Selkirk Focus: Alexander Fabric-Impressed	1 (7.1)	—	—
Pickering Branch/Blackduck Focus	—	—	1 (3.4)
Pickering Branch	—	—	3 (10.3)
TOTALS	14 (99.8)	6 (100.1)	29 (99.9)

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[1] Included in this list should be a recently recognized tool tentatively called a wedge. The writer in the past has classified these items as bipolar cores whereas they actually appear to represent a very simple multipurpose tool. They will be described in detail in a forthcoming publication. Their occurrence was as follows: Stratum I – 24; Stratum II – 5; Stratum III – 35.

As was stated earlier, strata II and III appear to be closely related in time with possibly less than a century separating the two deposits. Stratum I possesses some marked ceramic differences from the two earlier strata. These differences appear to stem largely from the addition of a Michigan ceramic complex. The body sherd seriations for the three strata given in Tables 3 to 5 also illustrate the close ceramic similarity between strata II and III and the ceramic discontinuity between Stratum I and the preceding strata. In order to express more clearly the degree of body sherd treatment similarities between the strata, the coefficient of similarity (Brainerd, 1951) was used. Identical comparative units and completely dissimilar comparative units would theoretically have coefficients of 200 and 0 respectively. The two coefficients for Stratum I and strata II and III are 95 and 97 whereas the coefficient for Stratum II and Stratum III is 186. These coefficients reflect the high incidence of plain sherds in Stratum I which are probably associated with the Michigan ceramic complex. It will be noted on Table 6 that a dotted line separates the Blackduck focus from the Selkirk focus. This has been done to emphasize the overlap of the two foci. From the Rainy River north at least to Lac Seul and westward into southeast Manitoba, the Blackduck and Selkirk foci ceramics are found mixed on single component sites, and the representation of the two foci at any one site is variable. Since the two ceramic complexes are usually so closely associated, there is frequently some difficulty in separating certain pottery types as to focus. For example, the Cemetery Point Corded pottery type is placed with MacNeish's Manitoba Corded Ware which pertains largely to the Manitoba focus (Blackduck focus of this report), and, at the same time, the pottery type in question is generally found on dominantly Selkirk focus sites of southeast Manitoba. At the Pic River Site, however, the pottery type is found in association with a predominantly Blackduck focus ceramic complex, and the fabric-impressed sherds, which represent the major marker of the Selkirk focus ceramics, are poorly represented. Because of this paucity of fabric impressing, the Cemetery Point Corded type is felt to be associated with the Blackduck ceramic complex. Such interpretational weighting of ceramic evidence as the preceding appears to be presently necessary in this area where a single, homogenous ceramic complex is the exception rather than the rule.

Projectile points tend to be uniform throughout the 700 years spanned by the three strata. Both notched and unnotched triangular forms are common, and these varieties are frequently characterized by a minimum amount of retouch along the edges of a flake, leaving the dorsal and ventral surface largely unmodified. A similar situation exists with the scrapers where the simple end scraper is dominant throughout the sequence. Small scraping, cutting, and gouging tools are also present in all three strata, but they have a much higher representation in Stratum I.

Bone artifacts of a wide variety are present throughout the sequence but show a marked decrease in number in the historic stratum. Traits which are present in all three strata are bone etching, worked beaver incisors, and awls.

Native copper tools, scraps, and nuggets are common to all strata. This is perhaps not surprising in light of the proximity of the site to the source of copper. It is interesting to note, however, the continued manufacture of native copper tools in the historic Stratum I.

The extent of archaeological internal culture change apparent at the Pic River site in a period of over 700 years is limited. Marked differences, such as the appearance of early Pickering branch ceramics in Stratum III and Michigan ceramics in Stratum I, are the product of introduction not indigenous development. Throughout the entire time period the Blackduck focus ceramics and very similar lithic and bone complexes are present with only slight modification. This slow rate of change may be compared to a portion of the cultural sequence seen at the Frank Bay site on Lake Nipissing (Ridley, 1954). Starting with the Primary Transitional Stratum at approximately A.D. 950, and terminating with the late historic component of slightly less than A.D. 1650, a time range of nearly 700 years is represented. Yet within this time range similar to that in the Pic River site, six separable but chronologically sequential stages of a single cultural development are present. Occasional 'foreign' sherds are present in the various strata, but they are the exception rather than the rule. There are a number of possible factors which would explain the different rates of culture change reflected by the archaeological sequences of the Pic River and Frank Bay sites. In the writer's estimation, the most important single factor is locality. It is assumed that the environment of the Boreal Forest, in which the Pic River site is located, would limit the population through the restricted food potential. This assumption is supported directly by the historical data (Hudson's Bay Company, 1857) and indirectly by the archaeological settlement pattern (Wright, 1963). Because of the small population of the area, it would appear that introduction of cultural traits rather than indigenous development was more responsible for cultural change. On the other hand, the Frank Bay site was associated with the large agricultural community of Southern Ontario which terminated in the historic Huron, Petun, Neutral, and Erie, and the pertinent portion of the sequence duplicates the cultural developments taking place to the south. In short, the rate of cultural change seen at the Pic River and Frank Bay sites would appear to reflect the different forces acting upon the small hunting and gathering bands of the former as opposed to the forces acting upon the large agricultural communities of the latter.

The ethnic identification of most late archaeological assemblages is a difficult task, and the fluid situation seen in the north has compounded the problem of association. Both Wilford (1955:136) and MacNeish (1958:79) have attributed the Blackduck focus to the historic Assiniboine. Bushnell (1927:42) has stated: "It is quite evident the Assiniboines, about the first years of the seventeenth century, moved northward from the densely forested region surrounding the headwaters of the Mississippi, where they formed a division of the Yanktonai, to the vicinity of the Lake of the Woods and beyond, where they soon became allied with the Cree. They continued to move northward and westward and by the close of the century were living in the region about Lake Winnipeg." If Bushnell's reconstruction is correct, then the Blackduck focus cannot possibly be the sole possession of the Assiniboine. The radiocarbon date of A.D. 962 ± 80 (GSC-85) from Stratum III of the Pic River site and another date of A.D. 1202 ± 60 (S-109) (McCallum and Wittenburg, 1962:77) from the mixed Blackduck and Selkirk foci site of

Hungry Hall Reserve (Kenyon, 1960*b*), indicate the pre-17th century occupation of northwestern Northern Ontario by the Blackduck focus. In addition, MacNeish's time estimate for the Manitoba focus (Blackduck focus) of southern Manitoba, which is based upon stratigraphy, ranges from A.D. 1000 to A.D. 1350 (MacNeish, 1958:61). Therefore, on the basis of radiocarbon dates from Northern Ontario and stratigraphic evidence from the Lockport site in southern Manitoba, it is evident that the Blackduck focus possesses a substantial time depth in Canada and is not simply the product of a late exodus to the north of one division of the Sioux. The assignment of the Blackduck focus to a single ethnic group is an impossible association since the distribution of the focus in Ontario, Minnesota, and Manitoba encompasses territory of the historic Assiniboine, Cree, and Ojibwa. It appears to be far more likely that all three of these historic tribes possessed the complex with varying degrees of intensity. For example, the historic stratum of the Pic River Site with its associated Michigan, Blackduck, and Selkirk ceramics has been attributed to the Ojibwa; the Swan Lake site in Northern Ontario (Kenyon, 1961:17) with its associated Selkirk and Blackduck foci ceramics has been assigned to the Cree; and levels 5 and 6 of the Lockport Site in southeast Manitoba with their associated Blackduck and Selkirk foci ceramics have been attributed to the Assiniboine (MacNeish, 1958:64). The preceding is not intended to refute past ethnic identifications with the Blackduck and Selkirk foci but is rather to emphasize the hazards of forming a one-to-one relationship between a single archaeological assemblage and a single ethnic group in an area where the blending of different assemblages is prevalent. Even when more comparative data are available from historic Late Woodland sites in the area, the limited ethnohistoric sources may still have to be relied upon for accurate ethnic assignment. Perhaps the limited distribution of burial mounds in the Blackduck focus will have significance as an ethnic trait. The solutions to a large number of such problems could be of assistance in unravelling the ethnic affiliations in the large area occupied by the Blackduck focus. The situation seen at the multi-component Pic River Site, however, suggests that assemblages derived from more than one tradition may be assigned to a single ethnic group. The available comparative data support this premise which makes ethnic identification in the area an extremely hazardous undertaking.

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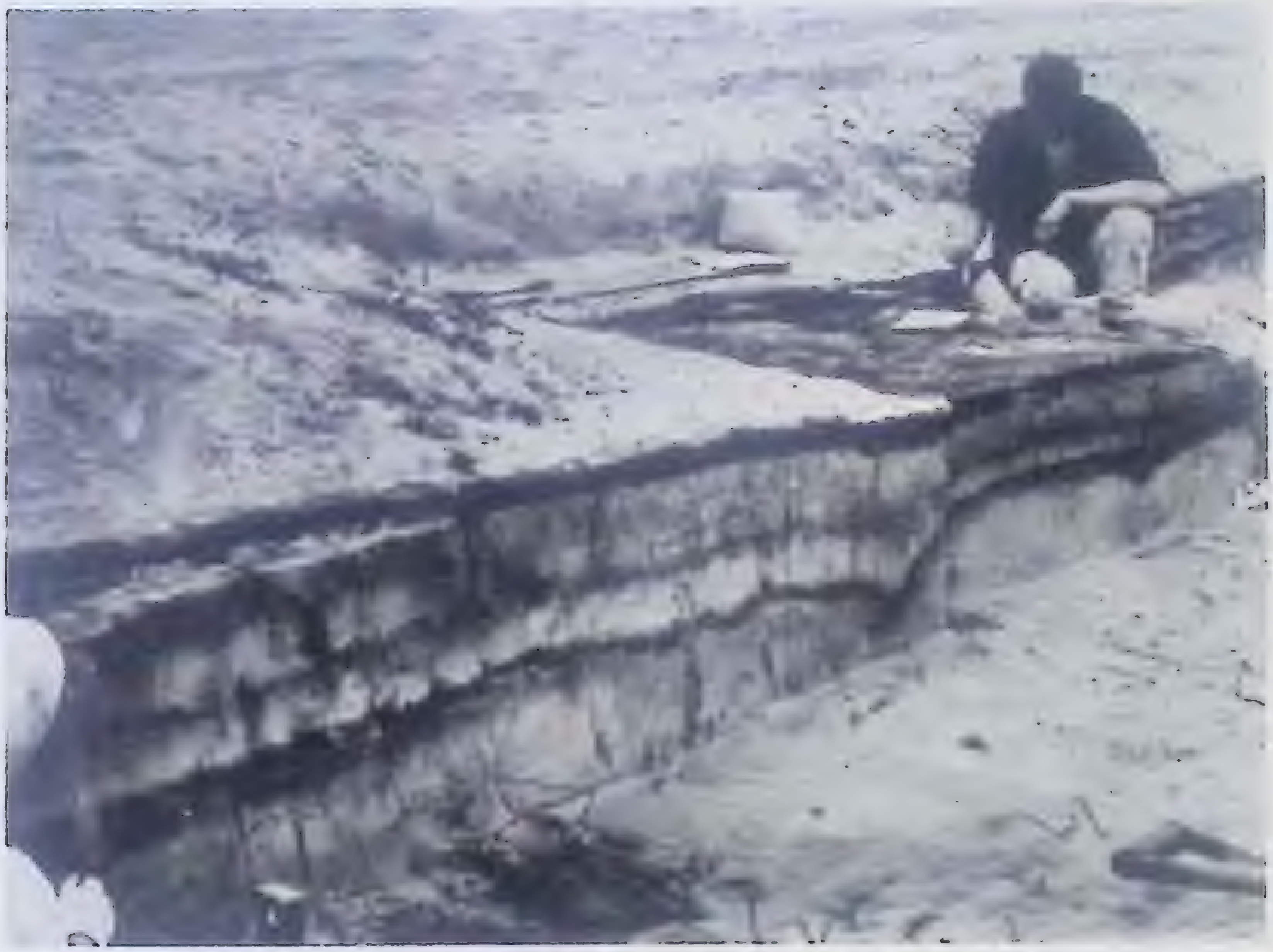

Stratigraphy of the upper beach area of the Pic River Site

PLATE II

STRATUM I

Fig.

1–4 —Blackduck rims
5, 7 —Michigan rims
6 —Selkirk rim
8 —Triangular projectile point
9 —Notched projectile point
10 —End scraper
11 —Side scraper
12, 13 —Small tools
14 —Pottery gaming disc
15 —Lead shot
16 —Lead musket balls
17 —Tubular bone bead
18 —Etched bone tool
19 —English gunflint
20 —French gunflint

Fig.

21 —Native copper fishhook
22 —Iron fishhook
23 —Kaolin pipe stem
24 —Bone bangle
25 —Native copper knife
26 —Iron strike-a-light
27 —Trade beads
28 —Silver button or buckle
29 —Projectile point made from copper kettle
30 —Ramrod ferrule (?)
31 —French clasp knife
32 —Silver alloy triangular pendant
33 —Triangle made from copper kettle
34–36 —Bangles made from copper kettle

PLATE II

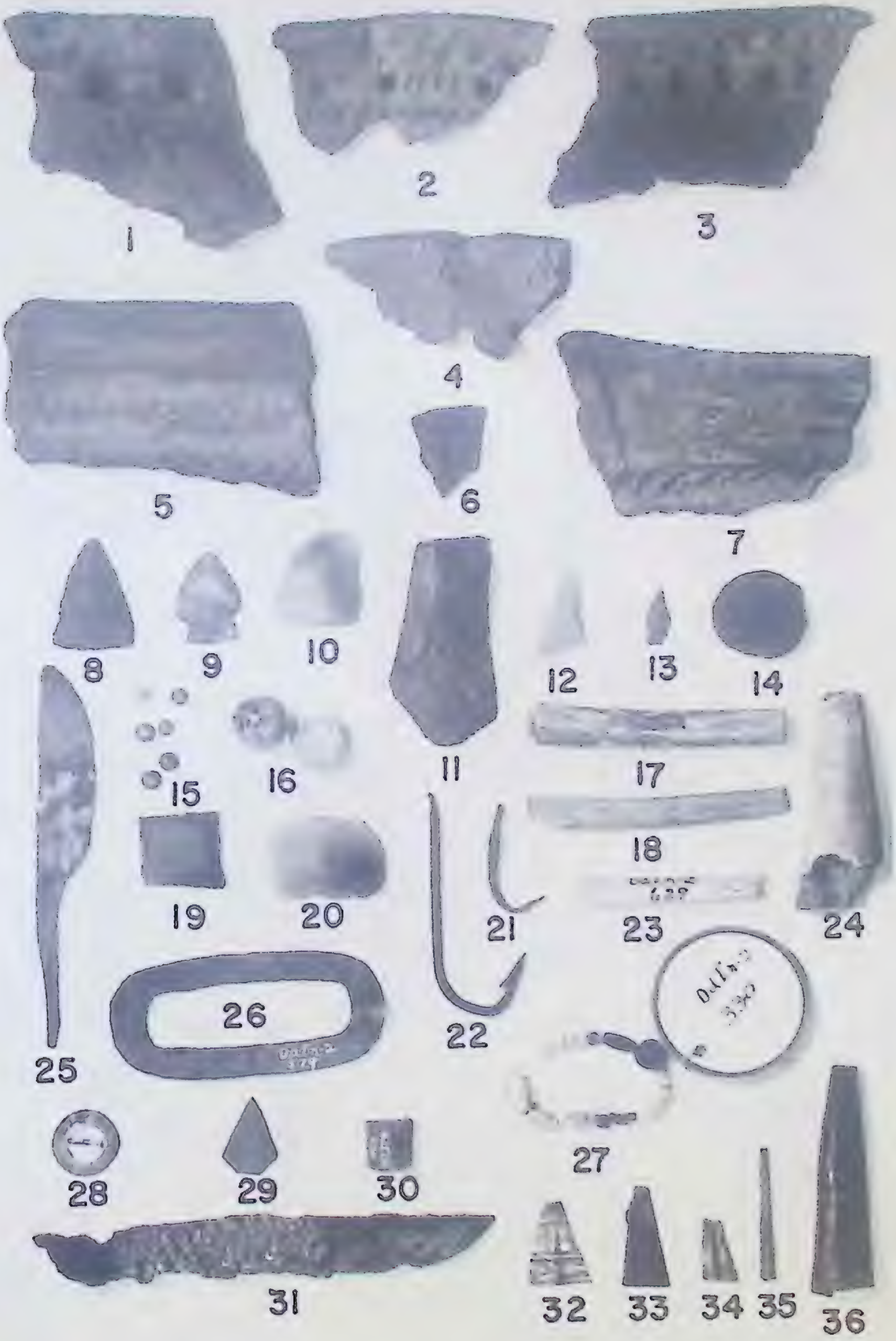
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PLATE III

STRATUM II

Fig.
1–5 —Blackduck rims
6, 7 —Cord impressed body sherds
8 —Catlinite block
9 —Shoulder sherd
10, 11 —Triangular projectile points
12 —Notched projectile point
13, 14 —End scrapers
15 —Small tool
16 —Polishing stone

Fig.
17 —Anculosa shell bead
18 —Native copper bar
19 —Unilaterally barbed harpoon
20 —Beaver incisor chisel
21 —Bone awl
22 —Probable base of a harpoon
23 —Drilled and ground turtle shell fragment

PLATE III

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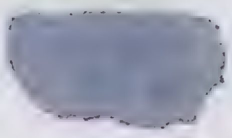
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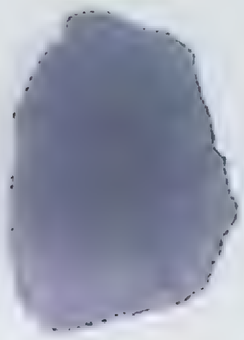
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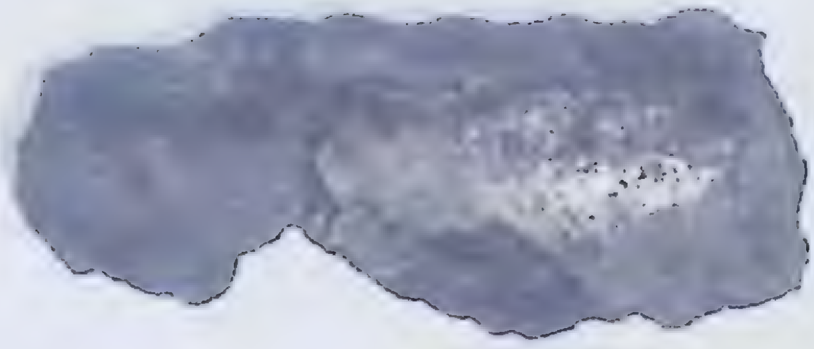
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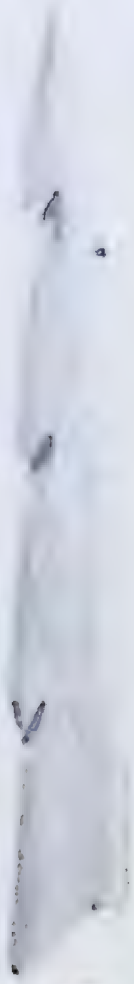
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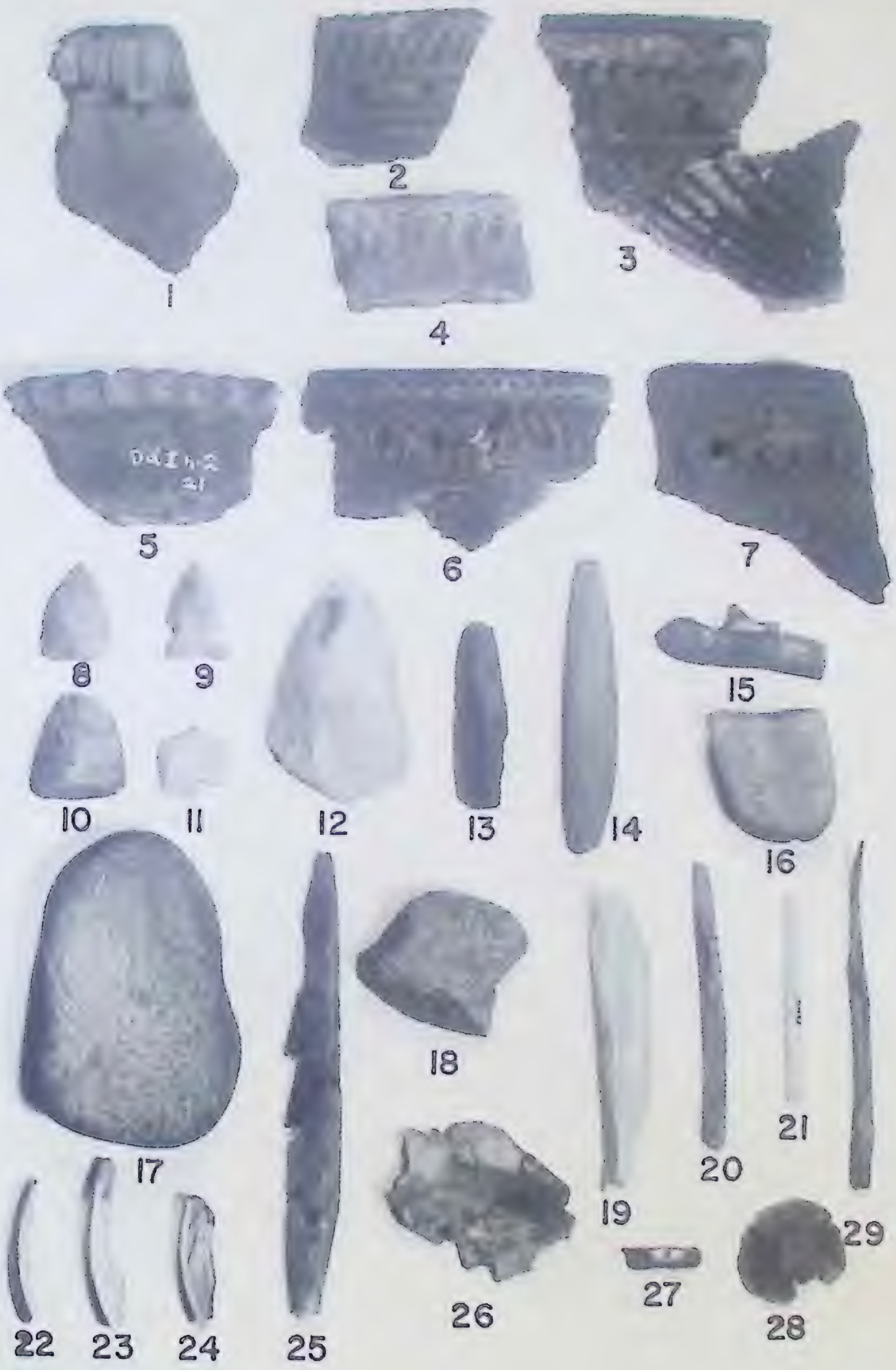
PLATE IV

Stratum III

Fig.	
1–5	—Blackduck rim sherds
6	—Blackduck / Pickering (?) rim sherd
7	—Pickering rim sherd
8	—Triangular projectile point
9	—Notched projectile point
10	—End scraper
11	—Graver (?)
12	—Biface blade
13	—Flake blade
14	—Ground schistose object
15	—Soapstone pipe
16	—Slot abrader

Fig.	
17	—Polishing stone
18	—Split femur ball of a moose used for abrading
19	—Etched bone
20, 21	—Bone awls
22–24	—Lateral cross-sections of three varieties of beaver incisor chisels
25	—Unilaterally barbed harpoon with line hole
26	—Worked turtle shell
27	—Native copper bead
28	—Native copper ornament
29	—Native copper awl

PLATE IV



PRELIMINARY REPORT ON THE MORRISON'S ISLAND-6 SITE

BY CLYDE C. KENNEDY

RÉSUMÉ

La station no 6, à l'île Morrison (station MN6), consiste principalement en un complexe culturel de la période archaïque de l'Est, dont la caractéristique prédominante est l'emploi du cuivre natif dans la fabrication d'objets d'utilité et d'ornamentation. Cette station se trouve dans l'île Morrison, comté de Pontiac, province de Québec, dans un chenal de la rivière Outaouais, à environ trois milles en aval de Pembroke (Ontario).

Poste de pêche et cimetière, la station MN6 a livré dix-huit sépultures et environ 2,300 objets façonnés en pierre, en os, en corne ou en cuivre. Huit des sépultures sur lesquelles avait été répandue de la sanguine contenaient des articles, non seulement en cuivre, mais aussi en pierre aiguisée comme des gouges et des herminettes. Parmi les 276 objets façonnés en cuivre qu'on y a trouvés, mentionnons 23 pointes de projectiles, 5 haches (y compris une hache à douille ressemblant beaucoup à celle que l'on a découverte à la station Reigh, dans le Wisconsin), 25 aiguilles (dont 13 ont des chas), des hameçons, des gorges, des alènes, des poinçons, des bracelets, des pendentifs et des couteaux.

On y a trouvé 325 pointes et parties de pointes de projectiles en pierre. Elles comprennent divers types qu'on a trouvés dans des stations laurentiennes: encochées au coin, encochées au côté et à tige. Les autres objets en pierre comprennent des grattoirs ressemblant à des herminettes, des gouges, un objet ressemblant à une sonde, des marteaux de pierre, des forets et un très grand nombre de pierres à meuler (768). Parmi les objets en os que l'on a récupérés, il y a des harpons (dont quelques-uns ont des trous d'attache), des aiguilles à chas, des gorges, des alènes, ainsi que des parties de tranchants de gouges. Des lignes parallèles et en zigzag, des rangées de points creusés à la gouge et de courtes lignes gravées ornementent vingt des articles en os, en pierre ou en cuivre.

C'est du complexe de Brewerton de la tradition laurentienne, défini particulièrement pour l'État de New-York, que semble le plus se rapprocher le principal complexe représenté à cette station. Toutefois, celle-ci renfermait beaucoup plus d'articles en cuivre qu'il n'en a été rapporté dans le cas des autres stations laurentiennes. On a déjà trouvé certains de ces objets en cuivre, comme une hache à douille et des aiguilles à chas, à des stations attribuées au vieil âge du cuivre qui, apparemment, se concentrait dans le Wisconsin.

Selon l'auteur, il est possible que le peuple laurentien qui habitait l'île Morrison travaillât non seulement le cuivre natif, mais le troquât aussi contre certains objets en cuivre des hommes du vieil âge du cuivre. Ainsi les découvertes faites à la station MN6 pourraient laisser supposer que cette ancienne culture était contemporaine, du moins en partie, du complexe Brewerton de la tradition laurentienne, qui date d'environ 3,000 à 5,000 ans.

SUMMARY

The Morrison's Island-6 Site (MN6 Site) has as its main component a cultural complex of the Eastern Archaic, a prominent trait of which at this site is the use of native copper to fashion utilitarian and ornamental objects. The site is located on Morrison's Island, Pontiac County, Quebec, in a channel of the Ottawa River, about three miles downstream from Pembroke, Ontario.

A fishing station and cemetery, the MN6 Site yielded 18 burials and about 2,300 artifacts of stone, bone, antler, and copper. Eight of the burials which were sprinkled with red hematite contained not only copper artifacts but also ground stone objects such as gouges and adzes. Among a total of 276 copper artifacts found at the site are 23 projectile points, 5 axes (including a socketed axe very similar to one found at the Reigh Site in Wisconsin), 25 needles (13 of which have eyes), fishhooks, gorges, awls, punches, bracelets, pendants, and knives.

A total of 325 stone projectile points and parts of points were found. They include various types that have been found at Laurentian sites: corner-notched, side-notched, and stemmed. Other stone artifacts include adz-like scrapers, gouges, a plummet-like object, hammerstones, drills, and a very large number (768) of grinding stones. Among bone objects recovered are harpoons (some with line holes), eyed needles, gorges, awls, and parts of the cutting edges of gouges. Twenty objects of bone, stone, and copper were decorated with parallel and zigzag lines, rows of gouged-out dots, and short impressed lines.

The strongest relationships of the major complex represented at the site appear to lie with the Brewerton complex of the Laurentian tradition, defined particularly for New York State. However, the site yielded a much larger number of copper artifacts than have been reported for other Laurentian sites. Some of these copper items, such as a socketed axe and eyed needles, have previously been found on sites attributed to the Old Copper Culture which was centred in Wisconsin.

The author suggests the possibility that the Laurentian people who inhabited Morrison's Island not only worked native copper but also traded for certain copper items with people of the Old Copper Culture. Thus the findings at the MN6 Site might suggest that the Old Copper Culture was contemporaneous, in part at least, with the Brewerton complex of the Laurentian tradition, which has been dated at from about 3,000 years ago to 5,000 years ago.

INTRODUCTION

The Morrison's Island-6 site, referred to as the MN6 site in a previous preliminary report (Kennedy, 1962), has as its main component a cultural complex of the Eastern Archaic (Byers, 1959), a prominent trait of which at this site is the use of native copper to fashion utilitarian and ornamental objects.

The site was discovered in May, 1961, and excavations were carried out during 1961 and 1962.

LOCATION

The site, located in the southeast area of Morrison's Island, Pontiac County, Quebec, on property owned by Harry S. Smith of Pembroke, stands between 73 and 78 feet above the low water level of 352 feet above sea-level recorded for Lower Allumette (Westmeath) Lake on July 28, 1962.

The island, which has an area of about two-thirds of a square mile, lies in a channel of the Ottawa River, between Upper and Lower Allumette (Westmeath) Lakes, about three miles downstream from Pembroke, Ontario. The island has a maximum elevation of 98 feet above the mentioned low water level. It lies within the southerly boundary of the Precambrian rocks of the Canadian Shield, but it is part of a Palaeozoic outlier of the St. Lawrence Lowlands (Caley and Liberty, 1957). The rock series of the island includes limestone, shale, and sandstone. In the MN6 area the bedrock limestone is overlaid by a thin mantle of sand and silt.

The island was first inhabited by white settlers in the early 1800's (Anon., 1959). The area which includes MN6 was last ploughed in 1917, according to a district farmer, and is now covered with sod.

Bridges connecting the island with the Ontario mainland and with Allumette Island, Quebec, were completed in 1956, and Highway 8 across the island was opened to traffic in November of that year.

EXCAVATIONS

The site was divided into 5-foot squares. When features were encountered, sufficient adjacent squares to encompass the area of interest were opened. It was decided to dig the site in 3-inch levels, for most of the plough-disturbed material would lie within the first two such levels. All excavations were carried out with hand trowels, except during the last few days before the site had to be vacated. At that time careful horizontal planing of areas that seemed to indicate burials was carried out with shovels, but no burials were revealed by this method. The vertical and horizontal location of artifacts was recorded to the nearest inch. A total area of 4,025 square feet was excavated.

FEATURES

Eighteen burials, and possibly the remnant of another, were uncovered. Twelve of these were extended; five were bundle burials; and one was a flexed burial. A pair of articulated feet, found on a fence line, may represent a disturbed burial.

Eight of the burials were sprinkled with red hematite, and two were accompanied by chunks of hematite. It is interesting to note that, although burials numbered 12 and 15 each contained a large bevelled, stemmed copper projectile point with a distinctive 'fluked' base (Fig. 3, no. 6), burial 12 was sprinkled with red hematite, but burial 15 contained no hematite.

Among the grave goods of special interest were the following, listed after burial numbers: *4*, stone adz, eyed bone needle, decorated antler; *5*, small copper projectile point (limestone slabs on lower legs and feet); *6*, turtleshell rattle, eyed bone needle, chunk of copper, beaver tooth knives and chisels; *7*, short stone gouge (Fig. 3, no. 3), stemmed copper projectile point, heavy copper awl; *9*, broken or 'killed' sandstone plummet-like object; *11*, long stone gouge, bone harpoon, flat copper axe; *13*, tiny copper beads, eyed bone needle; *14*, partially broken or 'killed' flat, copper axe (Fig. 3, no. 7); *16*, socketed copper axe or 'spud' (Fig. 3, no. 1), two flat copper axes; *17*, heavy copper bracelet (Fig. 2, no. 2) on each upper arm, copper knife; *19*, a small bracelet (Fig. 2, no. 1) on each lower arm, piece of decorated bone, small bone harpoon or projectile point, bands of tiny copper beads on arms and legs.

ARTIFACTS

About 2,300 artifacts of stone, bone, antler, and copper were recovered.

1. Copper

A total of 276 copper artifacts, not counting beads, were found distributed throughout the site. Five beads were found in site refuse, and an indefinite number of very small beads were in bands on legs and arms of burials. Most of the beads in these bands had crumbled because of corrosion.

Bits and chunks of copper, not counted in the total of copper artifacts, occurred throughout most of the site refuse. Some of these pieces appeared to be unworked; others were partially worked (flattened, for example). They suggest that copper was worked at the site, for they are not simply flakes off artifacts.

The artifact type designation referred to in this report is that of Wittry (1957*a*), unless otherwise indicated.

(*a*) *Projectile Points*

Twenty-three copper projectile points found in various parts of the site include 20 flat, stemmed points; one socketed point (Fig. 3, no. 4); and one point that may have had a socket, now pounded flat. The base of one point is missing. One projectile point base and three tips of either points or knives were also found.

The stemmed points range in length from 3.5 cm to 14.7 cm. The longest point has a small portion of the tip corroded away and was probably about 15.3 cm long before it was damaged. Nine of the stemmed points are distinctly and symmetrically bevelled along both edges of the blade (Fig. 3, no. 5, 6).

Five points, ranging in length from 3.8 cm to 14.7 cm, have a distinctive 'fluke' at the base. The two largest of these were in burial 12 (Fig. 3, no. 6) and burial 15, and the other three were in general site refuse. Although points with blades of similar shape have been found in Wisconsin, Minnesota, Michigan, New York, Ontario, Quebec, Manitoba, and probably elsewhere in the northeast, the bases of the Morrison's Island points are unique in that similar bases have not been reported in the literature on Old Copper and Laurentian.

(*b*) *Axes*

The site yielded one socketed axe, or 'spud' (Fig. 3, no. 1), 11.8 cm long. This is type V-C, which has been found in Ontario as a stray item (Popham and Emerson, 1954; Fig. 4, no. 20). With the socketed axe in burial 16, which was sprinkled with red hematite, were two flat copper axes. A flat axe (Fig. 3, no. 7) was found in burial 14, a bundle burial sprinkled with red hematite. A flat axe and a stone gouge were found in burial 11, an extended burial sprinkled with red hematite. The base of what was probably a flat axe was found in the site refuse.

(*c*) *Gorges*

Thirty-nine gorges (Fig. 2, no. 6), ranging in length from 1.5 cm to 6.1 cm, were found. These are double-pointed and are generally rectangular or square in cross-section; a few are round in cross-section.

(*d*) *Compound Hooks*

These are much like gorges but have one end rounded and the other pointed (Fig. 2, no. 5). The 17 compound hooks range in length from 1.7 cm to 7.6 cm.

(*e*) *Fishhooks*

The 28 fishhooks (Fig. 2, no. 3) range in length from 3.5 cm to 5.7 cm in length. They are practically all rectangular or sub-rectangular in cross-section.

(*f*) *Harpoon*

The single copper harpoon is 17.8 cm long. It has one barb and a rectangular shaft, the cross-section of which is 6.0 mm by 5.0 mm.

(*g*) *Awls*

A total of 93 artifacts have been classified as awls and parts of awls, though it is difficult in some cases to differentiate awls from gorges. The awls are rectangular in cross-section and generally small, attaining a maximum length of 9.8 cm.

(*h*) *Punches*

Two relatively small punches, one rectangular and one square in cross-section, were found. Each has a pointed end and a blunted end, which had apparently been subjected to hammering. One punch is 6.0 cm long, and the other is 8.9 cm long.

(*i*) *Needles*

There are 25 copper needles, 13 of which have eyes (Fig. 2, no. 9). They range in length from nearly 5.0 cm to 13.2 cm. All the needles are rectangular or square in cross-section, with the exception of one which is rounded in cross-section.

(*j*) *Bracelets*

A bracelet was found on each of the lower arms of burial 19; one of these (Fig. 2, no. 1) has three rows of short, impressed lines along the outer face of the band.

A larger bracelet was found on each of the upper arms of burial 17 (Fig. 2, no. 2).

(*k*) *Pendants*

Seven objects have been classified as pendants or parts of pendants. The largest of these was clearly made for suspension, for it has a well-defined, folded-over end. It is 7.0 cm long and has a maximum width of 2.2 cm and a maximum thickness of about 2.0 mm.

(*l*) *Knives*

One knife (Fig. 2, no. 4) of type II-A-2 was found in site refuse; another of type II-A-1 was found among items in burial 17, which also included two copper bracelets. The first knife is 5.0 cm long, and the other one is 9.0 cm long. The tip of an artifact, much like the curved tip of the first knife, was found in site refuse. Other tips, listed with projectile points, may have come from knives.

(*m*) *Wedges*

Two objects are somewhat similar in form to wedges (Popham and Emerson, 1954: Fig. 3, no. 24) except that they do not thin down at the narrow end.

One is 5.0 cm long, has a maximum width of about (part is broken away) 1.6 cm, and tapers to a width of 5.0 mm. It has a maximum thickness of 5.0 mm. The other wedge is similar in general form and only slightly larger. Part of a third artifact, which might have been a wedge, was found.

(*n*) *Ring*

A somewhat oval, ring-like object was made by bending a piece of copper with a rectangular cross-section measuring about 3.0 mm by 2.0 mm. Outside dimensions of the ring, across the major and minor axes, are 1.7 cm by 1.3 cm.

2. STONE

(*a*) *Projectile Points*

A total of 325 stone projectile points and parts of points were found. They include various types similar to those found on Laurentian sites (Ritchie, 1944, 1958, 1961; Dragoo, 1959): side-notched, corner-notched, and stemmed. Practically all the points are made of chert; others are made of quartzite and slate.

A majority of the points are side-notched; less than 10 per cent are distinctly corner-notched. Classification of many of the points is difficult because of the indistinct forms; a point may have one notch at the side of the blade and one notch at the corner of the blade. The stemmed points are generally crude, and most of them are made from flat flakes.

Sixty side-notched points, selected on the basis of completeness (most of the MN6 points are damaged), and on the lack of apparent re-sharpening, range in length from 27 mm to 67 mm and in thickness from 5 mm to 11 mm.

A majority of these points range in length from 35 mm to 45 mm and in width from about 0.5 to about 0.8 times the length. Average dimensions are—length, 40 mm; width, 26 mm; and thickness, 7 mm. They are predominately biconvex in cross-section; a few are plano convex in cross-section. Most of the points appear to be very similar in general form to Brewerton side-notched points (Ritchie, 1961) and to points found at Laurentian-like sites in the Upper Ohio Valley, which includes parts of the states of Pennsylvania, Ohio, New York, West Virginia, and Maryland (Dragoo, 1959). Whereas two-thirds of the Brewerton side-notched points have ground bases, less than 5 per cent of the MN6 points have ground bases.

Only two of the points are of ground slate; one is 'barbed stemmed' (Wright, 1962: p. 133), and the other is triangular in cross-section and has an unfinished or broken base.

One triangular, Late Woodland or 'Madison' point (Ritchie, 1961) was found in the plough zone.

(*b*) *Adz-like Scrapers*

Seventeen slate and schist, adz-like scrapers, of Laurentian type (Ritchie, 1958: 15) were found, but small, thumbnail scrapers and triangular end scrapers were absent.

(*c*) *Ulus*

One piece of a ground slate artifact seems to be part of an ulu. Other pieces of sharply ground slate could be pieces of ulus. (In addition, there are 30 pieces of ground slate too small to indicate any particular artifact.)

(*d*) *Adzes*

The site yielded six adzes and the bit end of seven others. Two adzes were in burials.

(*e*) *Gouges*

A complete gouge 16.0 cm long (Fig. 3, no. 3) was found in burial 7, and a complete gouge 27.4 cm long was found in burial 11. Both gouges fall within Wright's (1962: 126) class 1, since each has a 'short, deep gouge depression.' Six pieces of gouges were distributed through the site refuse; other pieces of pecked stone may be parts of gouges.

(*f*) *Plummet*

A plummet-like sandstone object, broken into two pieces ('killed'?), was found with burial 9, a flexed burial. Unfortunately, however, this burial appeared to be partially disturbed, and the association therefore lacks some certainty. The artifact may have been in the burial fill.

(*g*) *Grinding Stones*

A total of 768 grinding stones, mostly of fine-grained sandstone that is native to Morrison's Island, and a few of slate, which does not occur on the island, were found throughout the site. Many of these grinding stones have deep grooves, the size and shapes of which indicate repeated rubbing of beaver teeth to make knives and chisels. Other grinding stones have grooves of various forms, probably as a result of being used to work such items as copper awls and gorges. Numerous pieces of fine-grained sandstone have adz-like edges. These may have been used to cut bone, which, after having been grooved on one or two sides, was broken apart. Some of the grinding stones have a single hole near one end, which was probably used for carrying these tools. Only one slate object, probably part of a whetstone, had a hole drilled in it. Four incomplete objects of fine-grained sandstone have notches that give them a plummet-like appearance. However, the artifacts are only 5.0 to 7.0 mm thick and may simply be parts of whetstones that were notched for carrying.

(*h*) *Problematical Objects*

A few unusually shaped, small, sandstone objects were found. In addition to triangles, there are flat, pointed artifacts and elongated 'pyramids' with curved sides. For example, one flat triangular object with curved sides has a base about one inch long and sides 4.2 cm long; it is 5.0 mm thick.

An elongated 'pyramid' is 5.8 cm long, has a rectangular base 10.0 mm by 5.0 mm, curves out to a slightly wider mid-section and curves in again to a point.

(*i*) *Hammerstones*

The site yielded 23 well-defined hammerstones and a few pieces which are possibly parts of hammerstones.

(*j*) *Drills*

Only four parts of stone drills were identified. Some of the copper items may have been used as drills. As a test, a projectile point, which had been made from pure copper using only a stone hammer, was tried as a drill. It was found that this point was quite adequate for drilling holes in the fine-grained sandstone, even without the aid of a handle or a bow drill arrangement. The point had to be re-sharpened several times during the drilling of each hole; this was done simply by rubbing it on the face of the piece of sandstone being drilled.

3. BONE

(*a*) *Harpoons*

Twelve complete bone harpoons, ranging in length from 8.6 cm to 21.0 cm and fairly large parts of another 21 harpoons were found. Four of the complete harpoons and seven of the partial harpoons have gouged-out line holes. All the harpoons are unilaterally barbed, and the number of barb notches ranges from one to six.

Another 105 smaller pieces of harpoon were recovered.

(*b*) *Needles*

A total of 89 bone needles and parts of needles were found scattered widely in the site refuse. Of these, 36 have an eye or part of an eye. All but one of the complete needles come within a range in length from 3.2 cm to 10.0 cm. The exception is a flat needle 13.7 cm long, with the eye 1.9 cm from the base. At the eye the needle is 5.0 cm wide. Most of the needles are very slender, with delicate, gouged-out eyes. One needle, for example, is barely over 1.5 mm wide at the eye, and its length is 3.4 cm. Many of the needles have an angular point at the base (Fig. 2, no. 8), and one is sharply pointed at the base.

(*c*) *Awls*

The site yielded 18 bone awls, mostly quite small.

(*d*) *Gorges*

Only two bone gorges were identified, but some of the many pieces of worked bone found throughout the site may be parts of gorges.

(*e*) *Gouges*

Four pieces of the cutting edges of bone gouges were found.

(*f*) *Fishhook*

Only one bone fishhook was found. It is 5.0 cm long; it is barbless and is curved at the lower end and has a gouged-out line-hole at the end of the shank.

(*g*) *Flute*

A broken, hollow bone, with an oval hole close to the undamaged end, may be part of a flute.

(*h*) *Worked Bone*

A total of 162 pieces of worked bone (cut or ground), which could not be related to any particular artifact, were found. Of these, 31 were tips of pointed objects (possibly awls or gorges or harpoons).

4. ANTLER

One socketed antler projectile point was found in the fill of burial 1. Several tips of antler were found.

5. BEAVER TEETH

A total of 446 beaver teeth, mostly worked, were found throughout the site refuse and in burials. Some of the teeth were ground on the biting end, to form 'chisels.' Others were ground on one side or the other to form 'knives.' A few teeth were smoothed at the root end.

6. DECORATED OBJECTS

A glimpse of the artistic interests of the Morrison's Island people is seen in a variety of decorations on 20 bone, stone, and copper objects.

One of the complete bone harpoons has short, parallel lines scribed along one side. Pieces of bone harpoons have one of the following design combinations: short, scribed, parallel lines, and a row of gouged-out dots; two rows of dots; or three zigzag scribed lines with two rows of dots.

Three very small, unidentified bone objects have scribed lines, gouged-out dots, and serrated edges. One of these is 4.4 cm long and is shaped much like a feather. It has two rows of short, oblique lines scribed on each face.

Another object, 3.6 cm long and 4.0 mm wide, is serrated along both edges and has a row of gouged out dots along each face.

Apart from the bracelet found in burial 19, the only decorated copper object is a pendant with a line of 13 impressed dots along one face.

A small broken bone tube, polished on the undamaged end, has two rows of zigzag lines scribed on it. And a small, flat, slate pebble has a series of radiating lines scribed on each face.

Burial 4 grave goods included a finely made, ground stone adz and an antler, cut to give it a triangular cross-section and scribed on two sides with a series of parallel lines. Burial 19 grave goods included a piece of bone, one face of which was scribed with a series of triangles containing parallel, scribed lines.

LATE INDIAN OCCUPATION

While the MN6 site is generally non-ceramic, plain sherds from the body of a pot were found at a depth of 21 inches in a disturbed area along a fence line. A pottery pipe stem was found in the plough zone. These ceramics may be contemporaneous with the triangular, Late Woodland projectile point, already mentioned, and with a small amount of trade goods, all of which were found in the plough zone. Trade goods included 14 glass trade beads, two small double-pointed iron awls, two iron knives, two pieces of trade brass, and part of a battered, brass trade cup (?).

A French iron trade axe is reported to have been found a few yards from the westerly boundary of the MN6 excavations. Testing in that area revealed no Indian occupation.

A fairly large quantity of trade beads, an iron trade axe, and iron trade awls were among contact items found at the MN2 site, which is one-fifth mile northeast of MN6 on a narrow bench between 15 and 20 feet above the low water level of Lower Allumette (Westmeath) Lake.

HISTORIC ITEMS

A tooth from a farm cultivation implement and an unidentified piece of iron were found in the plough zone.

TENTATIVE CONCLUSIONS

The strongest relationships of the major complex represented at the site appear to lie with the Brewerton complex of the Laurentian tradition, defined particularly for New York State (Ritchie, 1940, 1958), as suggested in the first preliminary report (Kennedy, 1962).

Brewerton side-notched projectile points (Ritchie, 1961) are well represented among points found at MN6. Stemmed points and Brewerton corner-notched points are minority types. The stemmed points are mostly of crude workmanship.

Totally absent were triangular projectile points of the type found at the Robinson site (14 per cent of all points) and the Oberlander-1 site (5.4 per cent of all points), which are components of the Brewerton complex (Ritchie, 1940, 1944). At Frontenac Island, where Ritchie (1945, 1951, 1958) sees a Frontenac complex resulting from the interaction of the Lamoka complex and the Brewerton complex, only three such points were attributed to the lower, Archaic zone (above which was a Point Peninsula occupation). Judging from Ritchie's preliminary survey of the Hudson Valley (Ritchie, 1958), triangular projectile points of the type from the Robinson and Oberlander-1 sites are relatively rare in Laurentian sites in that region.

Also totally absent from the MN6 site were small, thumbnail scrapers and triangular end scrapers (Anon., 1943: Fig. 39, a, b, c).

The number of the copper items from MN6 is very much greater than that reported for any other Laurentian site, and some of the copper traits have not been found on Laurentian sites in New York. The socketed projectile point and the socketed axe from MN6 are copper types that would generally be attributed to the Old Copper Culture which was centred in Wisconsin.

The socketed copper axe, or 'spud,' is very similar to one found at the Reigh Site in Wisconsin (Wittry, 1957*b*; Ritzenthaler, pers. comm.). Ritzenthaler (1957: 185) judged the Reigh site as belonging to the Old Copper Culture.

A similar, socketed, copper axe, without the step at the junction of the socket and blade, was found at Granby Center in central New York (Beauchamp, 1902: Plate I, no. 1), and two socketed axes with the step are in the copper collection of the Royal Ontario Museum (Popham and Emerson, 1954: 11). Griffin (1961: p. 118 and Plate XXIII) describes and illustrates 'Old Copper specimens' found near Brockville, Ontario, including a socketed copper axe. The copper artifacts were possibly in association with stone gouges, and Griffin (*ibid:*, 122) comments: "This find is important not only because of its geographic location in eastern Ontario but also because the account by Reynolds indicates that these Old Copper pieces were in association with stone wood-working tools, projectile points, and burials of what would now be regarded as a Laurentian or 'Boreal Archaic' complex."

The Robinson site yielded a copper gouge, described in part by Ritchie (1940: 45) as follows: "The upper half of the front presents a peculiar long V-shaped deep depression, strongly suggesting that the sides here were originally flanged in the manner of the so-called 'spuds,' and subsequently hammered down."

The eyed copper needles from MN6 have not been reported for Laurentian sites, but one was found at the Riverside Cemetery, Menominee, Wisconsin (Ritzenthaler, pers. comm.). No report has been published on the Riverside site, but apparently it is generally considered to be an Old Copper burial site (Wittry, 1962: 454; Crane and Griffin, 1959: 182).

The sprinkling of burials with red hematite is a trait of several complexes. It is noteworthy that burial 16 was one of several MN6 burials in which this trait was a prominent feature; burial 16 contained the socketed copper axe (or 'spud') which is similar to a socketed axe from the Reigh site where burials are sprinkled with red hematite. (The socketed axe at the Reigh site was found in a burial in 1899, but no information is available on whether or not the burial contained red hematite.) The use of red hematite on burials at the Riverside Cemetery is a common feature (Ritzenthaler, pers. comm.).

The Old Copper Culture is still only vaguely defined (Mason and Mason, 1961; Wright, 1963). Among the outstanding problems in considering this complex are the following: the still largely undefined stonework attributable to it; the diagnostic value of various copper artifact types; and the relationships between Old Copper and various other Archaic complexes.

Although thousands of copper artifacts that are generally attributed to the Old Copper Culture have been found as stray objects in Wisconsin (principally) and neighbouring states (Wittry, 1957*a*: 205), only a few caches of the artifacts and three reported Wisconsin burial sites—Reigh, Oconto, and Osceola—and the Riverside Cemetery in Michigan have been found.

As Wittry (1959: 64) points out, "It is even difficult with present data to compose a comparative trait list only for the three cemeteries because of the limited number of artifact types present." Excluding copper beads and copper strips (from a Reigh Site burial; no number reported), the copper artifacts from the three Wisconsin burial sites total 91; they are distributed as follows: Osceola, 36; Oconto, 22; Reigh, 33. These totals include such items as awls (21 of the 36 Osceola copper artifacts are awls), knives and flat axes, which do not have features sufficiently distinctive to make them diagnostic for any particular culture. It would appear that only about 30 of the 91 copper artifacts from the Wisconsin burial sites have such distinguishing features.

The small number of any one type of copper artifact from the Wisconsin burial sites adds to the difficulty. For example, those sites yielded only five conical copper points, distributed as follows: Reigh Site, 3 (2 type I-L; 1 type I-N); Oconto Site, 1 (type I-L); and Osceola Site, 1 (type I-L).

Notably absent from the MN6 site are conical copper points, though the socketed point (Fig. 3, no. 4) probably would be classed as a conical, type I-L, if the socket were at the base rather than at the mid-point. The MN6 socketed point appears to be similar in form to two copper points from the Bowmanville district of Chicago (Quimby, 1961: Fig. 17, C and H), which are described as conicals, type I-L. A suggestion that points of this type might have been produced by people other than Old Copper people is made by Quimby (*ibid:* p. 35) in commenting on Bowmanville district copper artifacts: ". . . the knife and socketed projectile points seem to be diagnostic type and are here interpreted as representing a former occupancy of the Bowmanville district by Old Copper or coeval cultures." The Bowmanville knife is similar in form and size to an MN6 site knife (Fig. 2, no. 4).

Wright (1963: 3) has cautioned: "Native copper projectile points of the conical and stemmed variety have been recovered from Middle Woodland sites. One Middle Woodland site alone produced 78 copper artifacts, consisting mainly of awls, gorges, and beads. It is, therefore, evident that postulated Old Copper Culture associations should be based upon typology and not just the presence of copper."

Wright (pers. comm.) found a conical copper point at the DdIn-1 site, a Middle Woodland site, on the north shore of Lake Superior. However, there appear to be at least four variants of conical copper points, and their differences might be important cultural and temporal indicators.

All of Wittry's (1957*a*) conical projectile point types occur in relative abundance at the Allumette Island-1 site (AL1 site), which is on Allumette Island, Pontiac County, Quebec, one mile from the MN6 site and at an elevation of about 45 feet above the low water level for Lower Allumette (Westmeath) Lake. With 6,200 square feet of the site excavated, AL1 has yielded 1,012 copper artifacts (not counting beads or pieces of copper) including 104 conical copper points out of a total 122 copper projectile points. Other copper point types at AL1 include socketed, notched-tang, rat-tail, and turkey-tail.

Characteristics of the AL1 stone projectile points are similar to those of the Otter Creek point described by Ritchie (1961: 40): "Blade ovoid or lanceolate, rarely trianguloid in outline, biconvex in cross-section; edges excurvate, less often straight; stem side-notched, notching seems to have been final operation, resulting in 'square' tangs. Base concave or less frequently straight. Almost invariably the base and tang edges have been ground or rubbed smooth, and in nearly all cases this treatment has been extended to the notch."

The outline form of the Otter Creek point and certain points found in Wisconsin, Missouri, and Illinois is quite distinctive, and there have been comparisons of Otter Creek, Raddatz side-notched, Modoc Rock Shelter side-notched (for which Fowler gives the alternate name 'Raddatz Notched'), Graham Cave side-notched, and Osceola points (Ritchie, 1961: 41; Fowler, 1959: 67; Wittry, 1959: 65). The base element, the tang element, and the haft element (Binford, 1963: 198) of all these points and the AL1 points exhibit a general similarity; but there are variations, not only in these elements, but also in blade forms and sizes.

In any case, projectile points with the basic form of the Otter Creek point were not found at the MN6 site; and the range of point types, apparently typical of the Brewerton complex, that occurs at MN6 does not occur at AL1. Furthermore, the MN6 points are mostly made of chert and basal grinding is infrequent, whereas a majority of the AL1 points are made of quartzite and the bases and notches of the points are prominently ground.

Ritchie (1961: 40), comments on the age and cultural affiliations of the Otter Creek point, as follows: "The prevailing point type of certain, still undescribed sites, apparently to be attributed to the poorly defined Vergennes complex of the Archaic Laurentian manifestation in western Vermont (Ritchie, 1944: 253–257)." He suggests that "A cross tie with the Brewerton complex in central New York is afforded by the occurrence of a few points of this type on the Robinson site (Ritchie, 1940, Plate 13, fig. 97) and, conversely, of Brewerton type side-notched, corner-notched and eared-notched types on the Vermont sites in question."

Analysis of AL1 site materials is in a preliminary stage, but the following additional points should be mentioned in view of the seeming Old Copper influences at MN6: (1) There are burials at AL1; (2) The many bits and pieces of copper at AL1 suggest that the metal was worked at the site, as appears to be the case for MN6; (3) The bone harpoons at AL1 are distinctly different from those at MN6; (4) The copper point type with the distinctive fluked base, found at MN6, has not been found at AL1.

The findings at MN6 might suggest that the so-called Old Copper Culture was contemporaneous, in part at least, with the Laurentian tradition. Laurentian people may have obtained the socketed axe through trade with Old Copper people. The same explanation could apply to the socketed copper projectile point found at MN6, though of course it could be merely a stray item.

In a discussion of the MN6 site materials, James V. Wright commented that they were not at all comparable to materials of what he terms the Shield Archaic. The latter is characterized by bi-faced blades, end scrapers, Raddatz side-notched projectile points, straight-based lanceolate projectile points, broad and corner-notched projectile points, and the virtual absence of stone grinding. There are some copper artifacts in the Shield Archaic—awls, fishhooks, and abundant hammered nodules.

In discussing manifestations of the Laurentian tradition, Ritchie (1944: 259) comments: "In central and western New York the Laurentian complex was energized by the infusion of a western element—native copper—probably obtained by trade contacts radiating from the Lake Superior mining region." Beauchamp (1902) illustrates the following copper items found in New York, many of which would be placed in the Old Copper designation and are similar to artifacts found, nearly always as 'strays,' in the St. Lawrence and Ottawa valleys or in states bordering lakes Superior and Michigan: socketed axes or 'spuds,' flat axes, knives, awls, gouges, and the following projectile point types: rat-tail (type I-C), notched-tang (Popham and Emerson, 1954: Fig. 4, no. 9), 'turkey-tail' points (*ibid:* Fig. 4, no. 10), and large, bevelled, leaf-shaped blades. A 'copper spearpoint' was found in 1962 at the O'Neil site in New York in the Archaic Brewerton horizon, radiocarbon dated at 2039 B.C. ± 220 years (Cotter, 1963).

Copper artifacts found at the Robinson site, in addition to the copper gouge (or re-worked 'spud'), included 12 awls, 8 gorges, and a flat axe. The Oberlander-1 site yielded 23 awls, 10 gorges, and a chisel fragment. Nine small irregular fragments of copper were found at Robinson, and 10 flakes or irregular bits of hammered copper were found at Oberlander-1 (Ritchie, 1940).

Commenting on the copper artifacts found at Brockville, which were mentioned previously, Griffin (1961: 122) concludes: "This find is also of importance because some of the archeologists in the northeastern United States have felt that the copper artifacts found in New York and New England were made from local copper sources. These specimens, however, with their striking similarity to Old Copper forms of the Upper Great Lakes and because of the presence of silver in the copper were probably traded or carried from that area to the upper St. Lawrence Valley."

Copper was extensively mined by the Indians on Isle Royale and on the Keweenaw Peninsula in Michigan and possibly on the Ontario shore of Lake Superior (Quimby, 1960; Griffin, 1961; Thomson, 1954). The copper from these deposits contains native silver, and Drier (1961: p. 147) concludes: "If native silver is present in an artifact, it can be safely concluded that the Lake Superior region was the source of the copper . . ."

One copper projectile point found in the MN6 site, in burial 5, has native silver inclusions in the stem and the blade. Scrapings from one of these inclusions were tested by neutron activation analysis, using a sample position in one of the nuclear reactors at the Chalk River Nuclear Laboratories. This test was kindly made by Dr. R. W. Durham, Development Chemistry Branch, Atomic Energy of Canada Limited. An awl and a flattened irregularly-shaped piece of copper from the AL1 site appear to contain native silver inclusions.

The possible Old Copper influences at the MN6 site might, as mentioned, be accounted for by contemporaneity of the Brewerton complex of the Laurentian tradition, dated at from about 3,000 years B.P. to 5,000 years B.P. (Ritchie, 1958: Fig. 5) and the Old Copper Culture. Dates for three sites assigned to the Old Copper Culture—the Reigh Site, the Osceola Site, and the Riverside Cemetery—range from about 3,000 years B.P. to about 3,700 years B.P. (Crane and Griffin, 1959).

Crane and Griffin (1959: 182) comment that consideration of the radiocarbon dates for Reigh, Osceola, and Riverside "suggests that the earlier Old Copper samples from Oconto Cemetery, Wisconsin, dated by the Chicago Laboratory (C-836, 5600 ± 600, and C-837 and C-839 combined, 7510 ± 600, Chicago V) are much too early."

Mason and Mason (1961: 143) express the view that "The acceptance of the two radiocarbon dates from the Oconto site at face value is embarrassed by several considerations. First, they fail to agree with each other by almost 2,000 years. Second, they are wholly at variance with the other radiocarbon dates interpreted as dating Old Copper at the Osceola site, the Reigh site, Riverside Cemetery, and Isle Royale; all of these dates cluster between 3,000 and 3,800 years ago . . . Third, they are out of line with the dates of other typologically Late Archaic components in Eastern North America."

It should be noted, however, that Quimby (1962) questions the dates for the Reigh, Osceola, and Riverside sites, pointing out that they were obtained from bone, which is considered to be less reliable than charred wood for dating. Charred wood was used to obtain the two dates for the Oconto site.

Quimby (*ibid.*, 1962: 17) reviews the dating of the Oconto site and indicates how a date of 5,710 years ago, or 3755 B.C., can be derived from the oldest Oconto radiocarbon date; he concludes: "This review of Old Copper radiocarbon measurements suggests to me that Reigh, Riverside Cemetery and Osceola are too young by an unknown amount and that Oconto dates somewhere between 4,000 B.C. and 3,000 B.C."

Griffin (1962: 158) discusses the dates for the Reigh, Osceola, and Riverside Cemetery sites and says that while they were obtained from bone specimens "the dating was done on the organic carbon and I believe the dates are not far off the mark . . . The cross-dating on Old Copper forms and associated projectile forms indicates that Old Copper is contemporary with New York Laurentian from roughly 2,400 B.C. to about 1,000 B.C."

Bits of charcoal were collected at MN6 from the fill of burial 17. Grave goods in the burial, which was sprinkled with red hematite, were two copper bracelets and a copper knife. The National Museum of Canada sent the charcoal sample to the Geological Survey of Canada which obtained a radiocarbon date of 4,700 ± 150 years B.P. (GSC-162). It is possible that the charcoal was a representative sample of charcoal strewn about the site by the Laurentian people who camped there. Charcoal-stained soil in the easterly part of the site, where burial 17 was found, extended to a depth of 11 inches. Well-defined sides of the burial pit could be seen extending from the 11-inch depth to a depth of 28 inches, the maximum depth of the pit. The charcoal-stained fill in the pit contrasted with the unstained soil surrounding the pit. The charcoal submitted for dating was collected between the depths of 16 inches and 28 inches.

In conclusion, the MN6 site could be a fishing station and cemetery of a Laurentian people who apparently worked some native copper and who may have traded for certain other copper items with a people whose tools and weapons included items that studies to date have placed under the broad designation of Old Copper Culture.

ACKNOWLEDGMENTS

Financial support by the National Museum of Canada for work at the MN6 site is greatly appreciated, as are the interests of and helpful consultations with former and present officers of the Museum: Dr. L. S. Russell, Dr. R. S. MacNeish, Dr. William E. Taylor, Jr., Dr. James V. Wright, and Dr. Lawrence Oschinsky. Considerable assistance through discussions and the loan of references was provided by Dr. James B. Griffin, Director, Museum of Anthropology, The University of Michigan.

Dr. James E. Anderson, Department of Anatomy, University of Toronto, kindly undertook a study of skeletal material from the site. Preparatory work on the skeletons was done by Mr. J. A. Dellaire of the National Museum of Canada.

Major assistance with excavation of the site was provided by Mr. Joseph Classey, Petawawa; Mr. Murray Mathieson, Pembroke; and Rev. John T. McGee, Stonehill College, North Easton, Massachusetts. Members of the Ottawa Valley Historical Society and others who assisted from time to time with the excavations, or with other activities related to the study of the site, include Mr. Leslie Cotnam, Mr. Stephen Butler, Mrs. Bodil Weaver, Miss Mary Morris, Dr. and Mrs. Colin Mawson, Miss Dianne White, Mrs. D. A. Bristow, Mr. and Mrs. Charles Rice, Mrs. Peter Morley, Mr. Edward Pettit, Mr. Allan Ball, and Mr. William Renison.

Permission to excavate on their property was kindly given by Mr. Harry S. Smith and Mr. Dean R. Rogers of Pembroke. (The latter was part owner of the property during 1961 excavations.)

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The excellent drawings of artifacts were done by Mr. A. W. Middleton.

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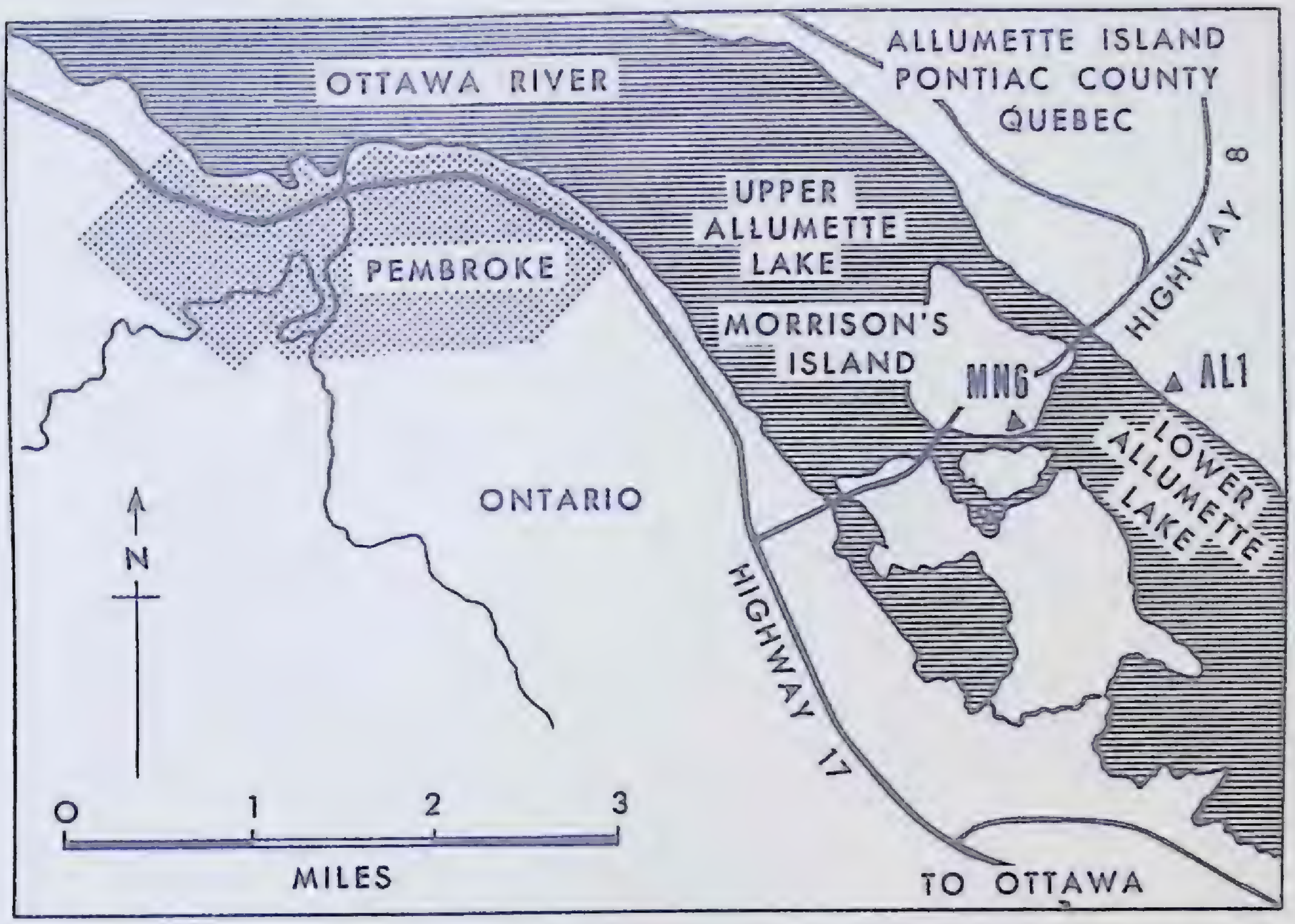


Figure 1—*Location of the Morrison's Island-6 (MN6) and Allumette Island-1 (AL1) sites*

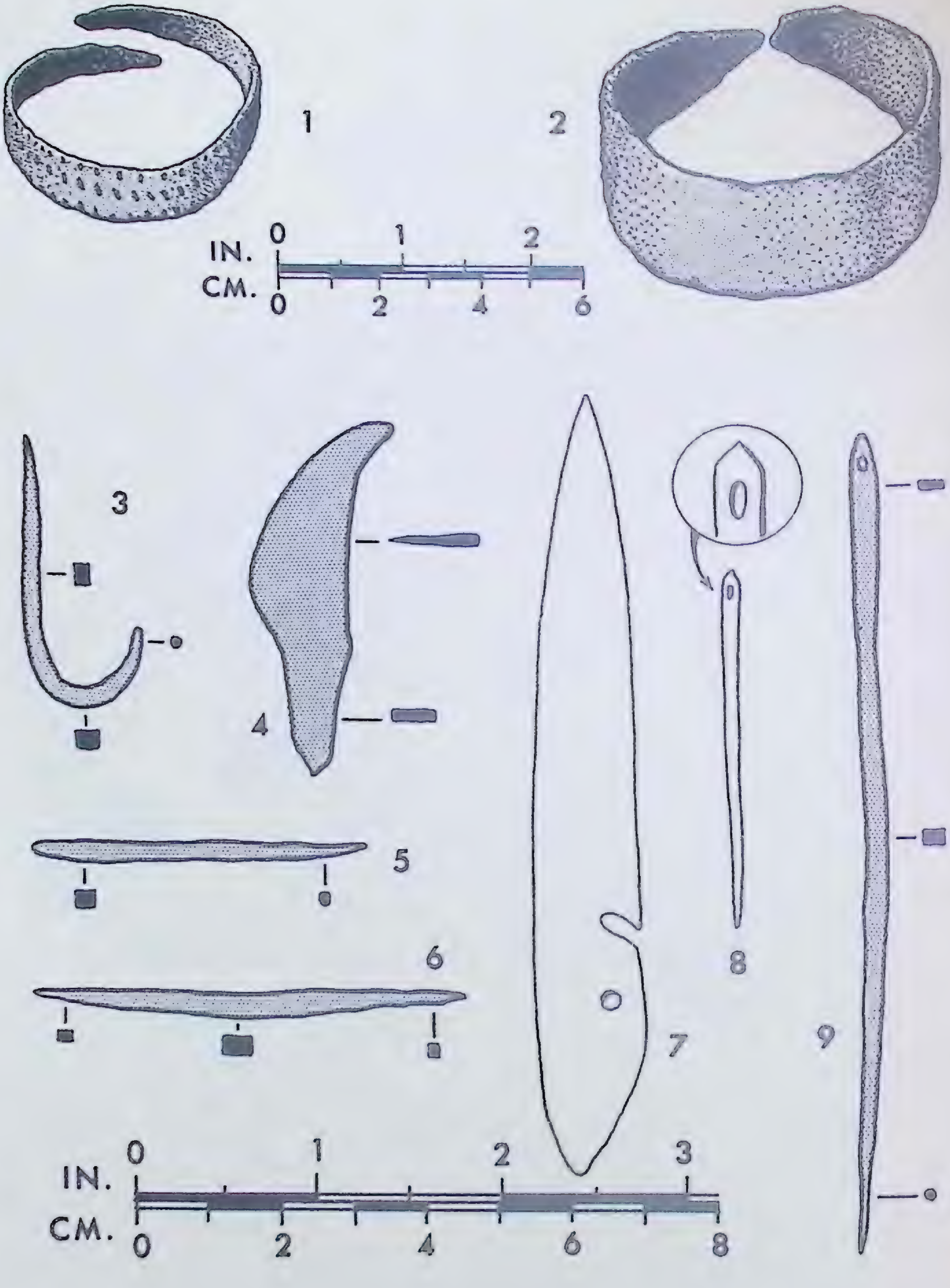


FIGURE 2—*Copper artifacts:* 1, decorated bracelet, burial 19; 2, bracelet, burial 17; 3, fishhook; 4, knife; 5, compound hook; 6, gorge; 9, eyed needle. *Bone artifacts:* 7, harpoon with line hole; 8, eyed needle

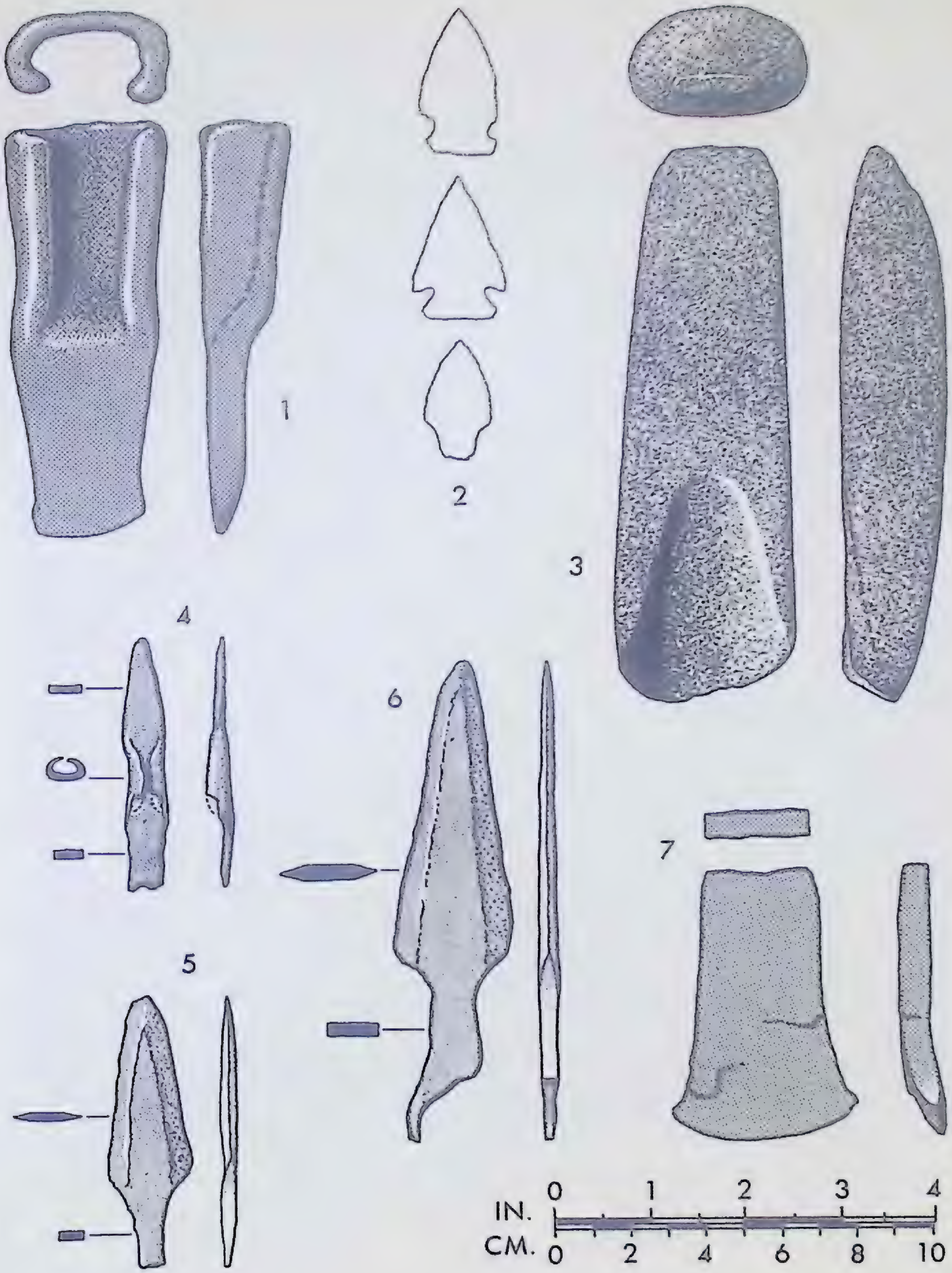
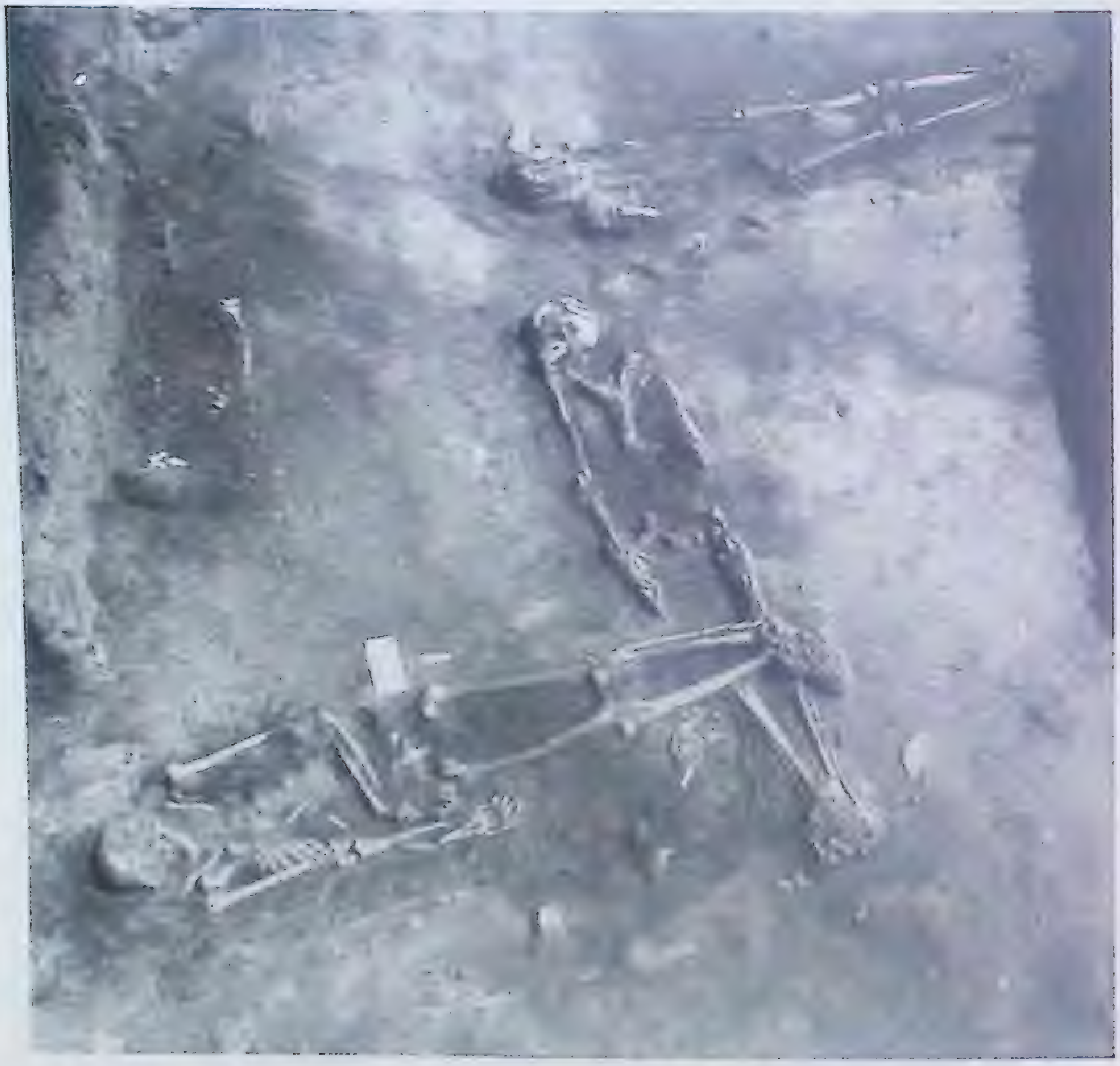


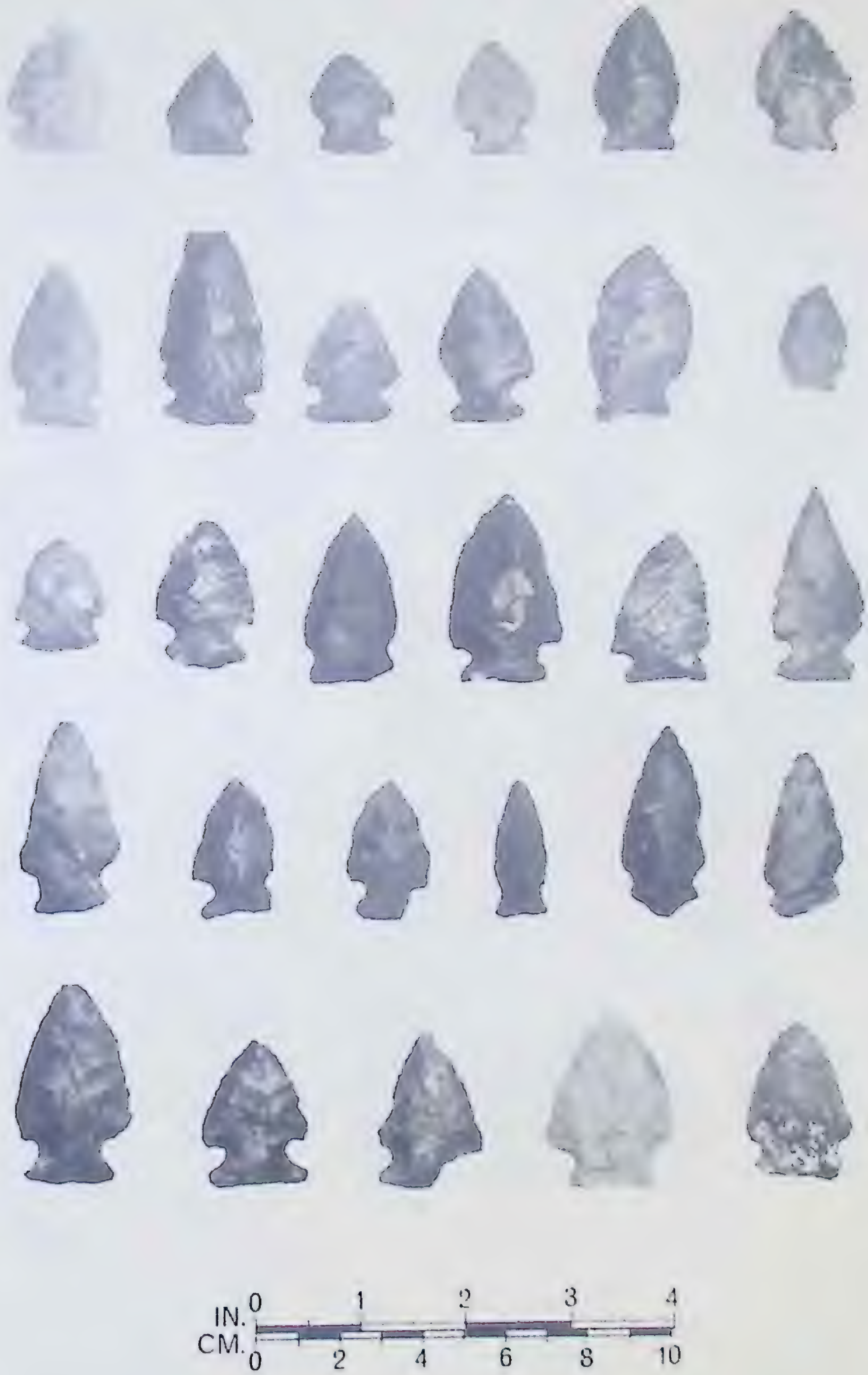
FIGURE 3—*Copper artifacts:* 1, socketed axe, or 'spud,' burial 16; 4, socketed projectile point; 5, stemmed and bevelled projectile point; 6, projectile point with single 'fluke' on base, burial 12, 7, flat axe, partly damaged, burial 14. *Stone artifacts:* 2, side-notched, corner-notched,and stemmed projectile points; 3, gouge, burial 7

PLATE I



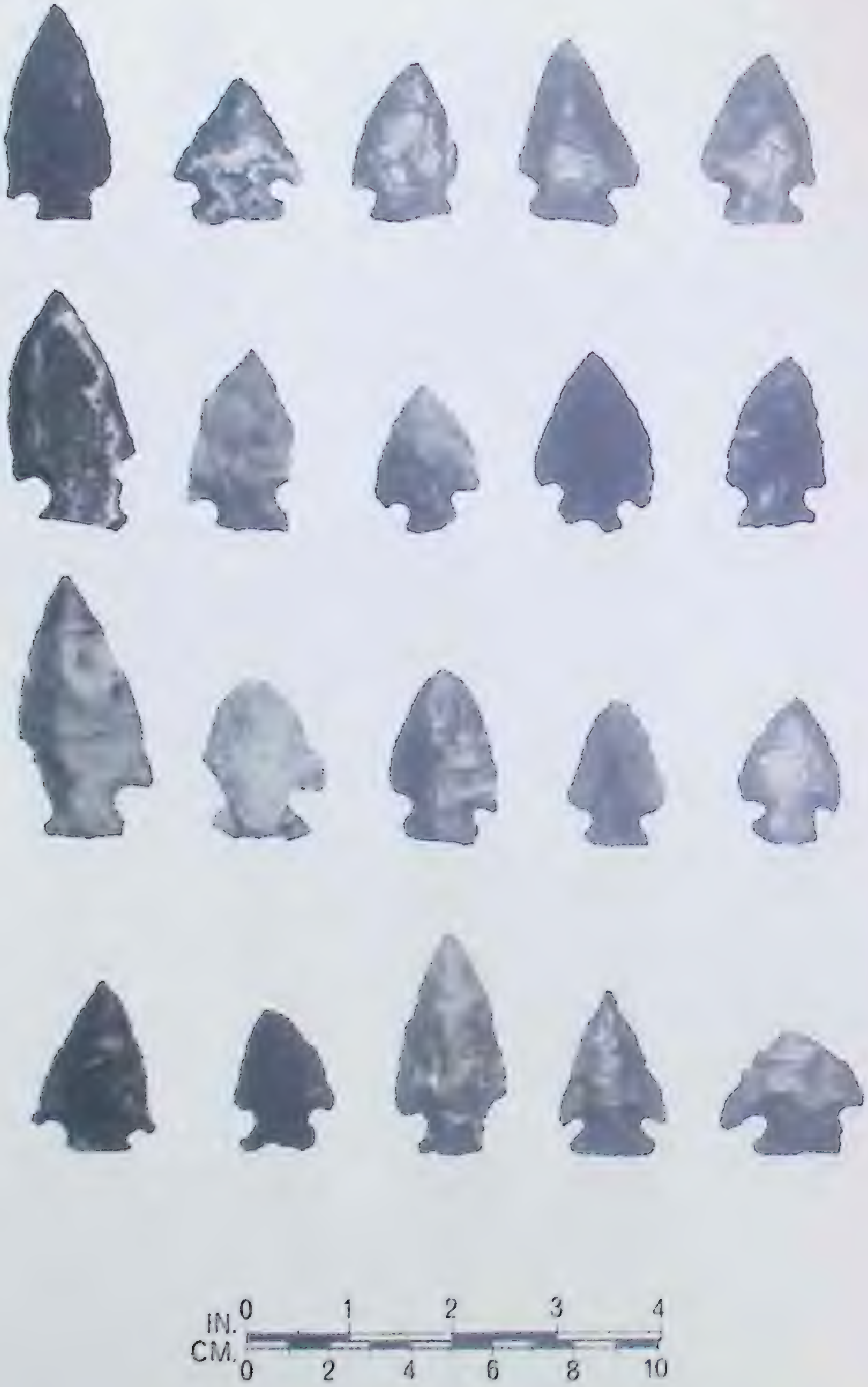
Burials 3, 4, and 6 (background to foreground). Burial 5 lies in dark area at upper left.

PLATE II



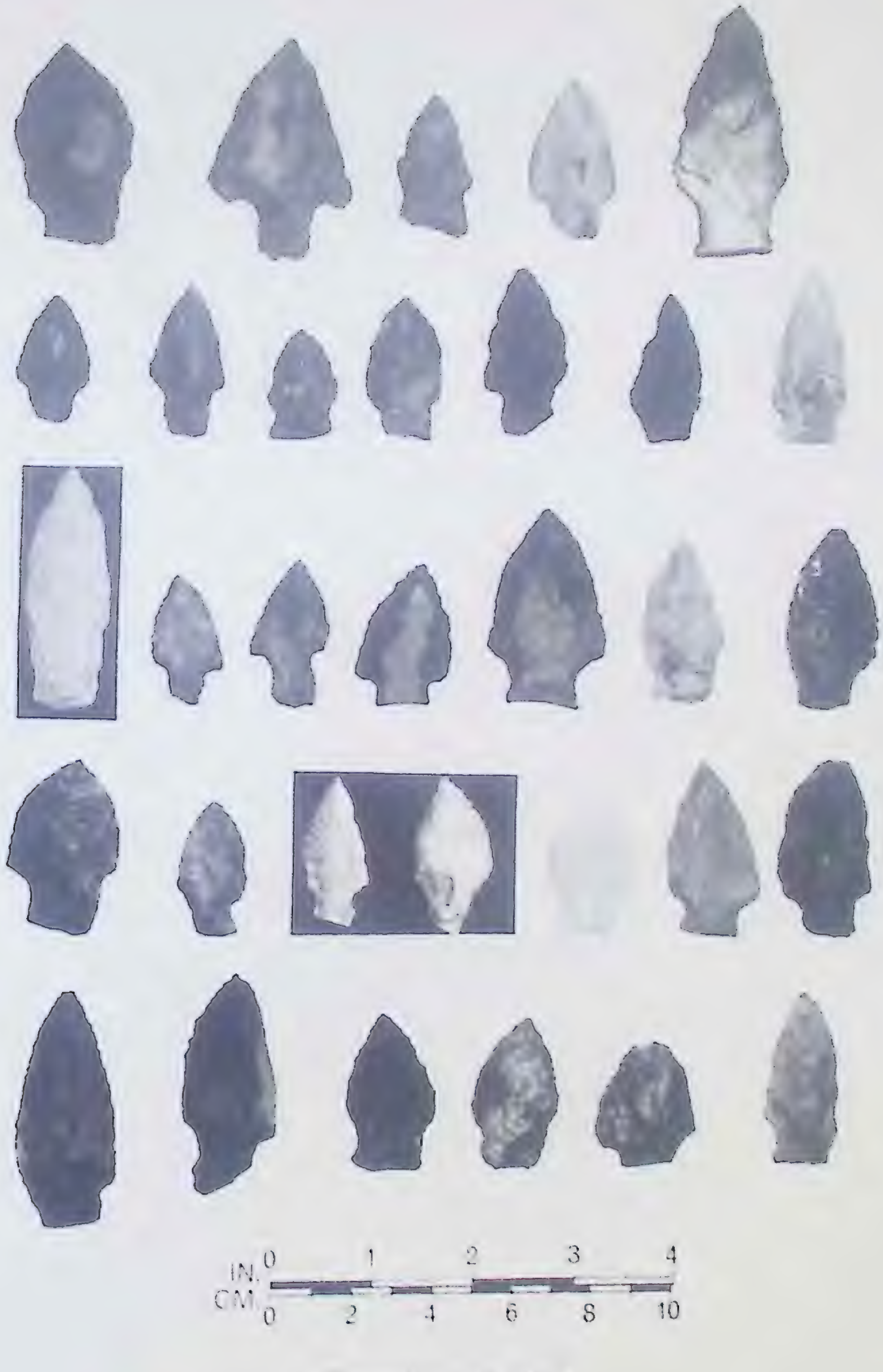
Side-notched projectile points

PLATE III



Corner-notched projectile points

PLATE IV



Stemmed projectile points

THE PAYNE SITE: AN IROQUOIAN MANIFESTATION IN PRINCE EDWARD COUNTY, ONTARIO*

BY J. N. EMERSON

RÉSUMÉ

L'«Emplacement Payne» est tout d'abord un rapport, étayé sur les faits, du travail accompli et des objets trouvés par l'Université de Toronto à cet emplacement particulier du comté du Prince-Édouard, en Ontario, durant la campagne de 1958.

En second lieu, le rapport cherche à situer l'emplacement Payne dans le temps et à découvrir sa situation géographique au moyen de nos connaissances actuelles des Iroquois de l'Ontario, par une comparaison générale avec une série d'emplacements iroquois choisis.

Troisièmement, le rapport aborde ces études sur les Iroquois avec un certain nombre de nouvelles techniques, par exemple, l'utilisation de coefficients de similitude à des fins d'analyse. M. Emerson formule le voeu que d'autres trouveront utiles ces techniques nouvelles.

Quatrièmement, par pur hasard, le rapport sur l'emplacement Payne a établi un remarquable précédent en assurant la validité de l'analyse de sériation fondée sur la détermination des groupes de poterie, employée pour la première fois par M. R. S. MacNeish. M. James F. Pendergast (voir «The Payne Site» par James F. Pendergast, Bulletin N° 193 du Musée national du Canada, Contributions à l'Anthropologie 1961–1962, Partie I, Secrétariat d'État, Ottawa, 1964) et M. Emerson, qui ne se connaissaient pas, ont tous deux déterré et analysé des échantillons provenant de l'emplacement Payne. Tous deux ont employé la méthode MacNeish; les conclusions et les interprétations de leurs travaux sont à tel point semblables qu'elles confèrent un haut degré de validité à la méthode MacNeish.

Enfin, le rapport, après avoir indiqué le lieu de l'emplacement Payne dans le contexte historique iroquois, cherche à explorer les forces culturelles qui l'ont produit, ainsi que le caractère socio-psychologique du peuple qui y a vécu.

SUMMARY

"The Payne Site" is, first, a factual reporting of the work done and materials recovered by the University of Toronto at this particular village site in Prince Edward County, Ontario, during the 1958 field season.

Secondly, the report seeks to define the temporal and geographical status of the Payne site in terms of the current knowledge of the development of Ontario Iroquois by means of a broad comparison with a series of selected Iroquoian sites.

Thirdly, the report introduces a number of new techniques in Iroquoian studies such as the utilization of coefficients of similarity for analytical purposes which Dr. Emerson hopes others may find useful.

Fourthly, and quite inadvertently, the Payne Site report resulted in a remarkable test case validating the seriation analysis based upon pottery typing pioneered

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*Major James F. Pendergast excavated this site in 1950–51 and subsequently his report, "The Payne Site," appeared on pages 1 to 27 of the National Museum of Canada's Bulletin 193, *Contributions to Anthropology 1961–62, Part I*, Ottawa, 1964. In 1958 Dr. J. Norman Emerson directed the work here reported by him. Because of a change in ownership of the site property after 1952, Emerson had no inkling of Pendergast's work and had named the site MacDonald (Emerson, 1960). Neither Emerson nor Pendergast knew of the other's excavation, analysis, or manuscript, until after W. E. Taylor had edited their respective reports. Both have enjoyed, as will other researchers, the opportunity to compare two entirely independent analyses of the one Iroquois site. Emerson's MacDonald site is Pendergast's Payne site, and, happily, they have agreed to use only the earlier name, the 'Payne' site. Both have been extremely kind and instructive to their pre-ceramic arctic colleague. W.E.T.

by Dr. R. S. MacNeish. Quite unknown to each other,James F. Pendergast (*see* "The Payne Site" by James F. Pendergast, in National Museum of Canada Bulletin No. 193, Contributions to Anthropology 1961–62, Part I, Department of the Secretary of State, Ottawa, 1964) and Dr. Emerson both excavated and analysed separate samples from the Payne site. Both used the MacNeish approach, and the resulting findings and interpretations are so remarkably similar as to constitute a high degree of validation for the MacNeish approach.

Finally, the report, having stated the place of the Payne site in Iroquois historical development, seeks to comment on the cultural forces which produced it and on the socio-psychological nature of the people who lived there.

INTRODUCTION

During the month of August 1958, the Department of Anthropology of the University of Toronto and the National Museum of Canada carried out a joint investigation of the Payne site near Bloomfield, Prince Edward County, Ontario. This site was selected for excavation after Mr. Bruce Drewitt and Mr. Richard Pearson had carried out an archaeological survey of Prince Edward County. Seven sites were located. The Payne site was the most productive and was available for investigation. The remaining sites either were in crop or were too small to merit the attention of our proposed field crew.

A second specific reason for excavating this site was its notation as an 'Indian fortification' on an early survey map dated 1832. This map was drawn to our attention by Mr. Gordon Walmsley, Q.C., of Picton. There was no indication, however, whether the surveyor was plotting evidence of ruins he actually saw, or whether he was simply recording information which was then current knowledge in the area. The excavation evidence shows that the village was occupied many centuries prior to 1832.

Major interest in the Payne site stemmed from a broad view of the problems of Iroquoian prehistory. Research over the last decade had established the Trent Valley Waterway as an important trade and prehistoric migration route connecting Huronia with both the St. Lawrence Valley and eastern New York State. In the summers of 1950 and 1951, the University of Toronto carried out investigations in the Coboconk area, which connected these sites with Huron sites in Simcoe County to the west. Relationships to the south via the Trent Valley were largely unknown, and the Payne site promised to throw light on this problem.

Excavation of the site was carried out under the joint direction of Mr. Bruce Drewitt of the University of Toronto and Mr. Richard Pearson, field assistant, of the National Museum of Canada. Field supervisors were Mr. Peter Harrison and Mr. Bruce Trigger, both of the University of Toronto. The crew included Miss Sheila Fischman and Miss Rosalind Murray of Toronto, Miss Mary Ellen Kropp of Kingston, and Miss Nancy Chase of New York, as well as Mr. and Mrs. John Craig and Miss Barbara Wynn of the Toronto Ontario Archaeological Society. The excavation work was aided by interested visitors including Mr. and Mrs. Fraleigh of Bloomfield, Mr. Dalton Metcalfe of Cherry Valley, Mr. P. Kostoff of Picton, and Mr. Willis Metcalfe and family of Black Creek, Ontario.

Archaeological survey work was appreciably facilitated by the following gentlemen who offered valuable information on the area and allowed us to study their collections: Mr. K. Alkenbrach of Napanee, Mr. F. C. Church of Black Creek, Mr. W. Grubin of Picton, Mr. W. Metcalfe of Black Creek, the Reverend D. Bowen Squires of Consecon, and Mr. J. Taylor of Hillier, Ontario.

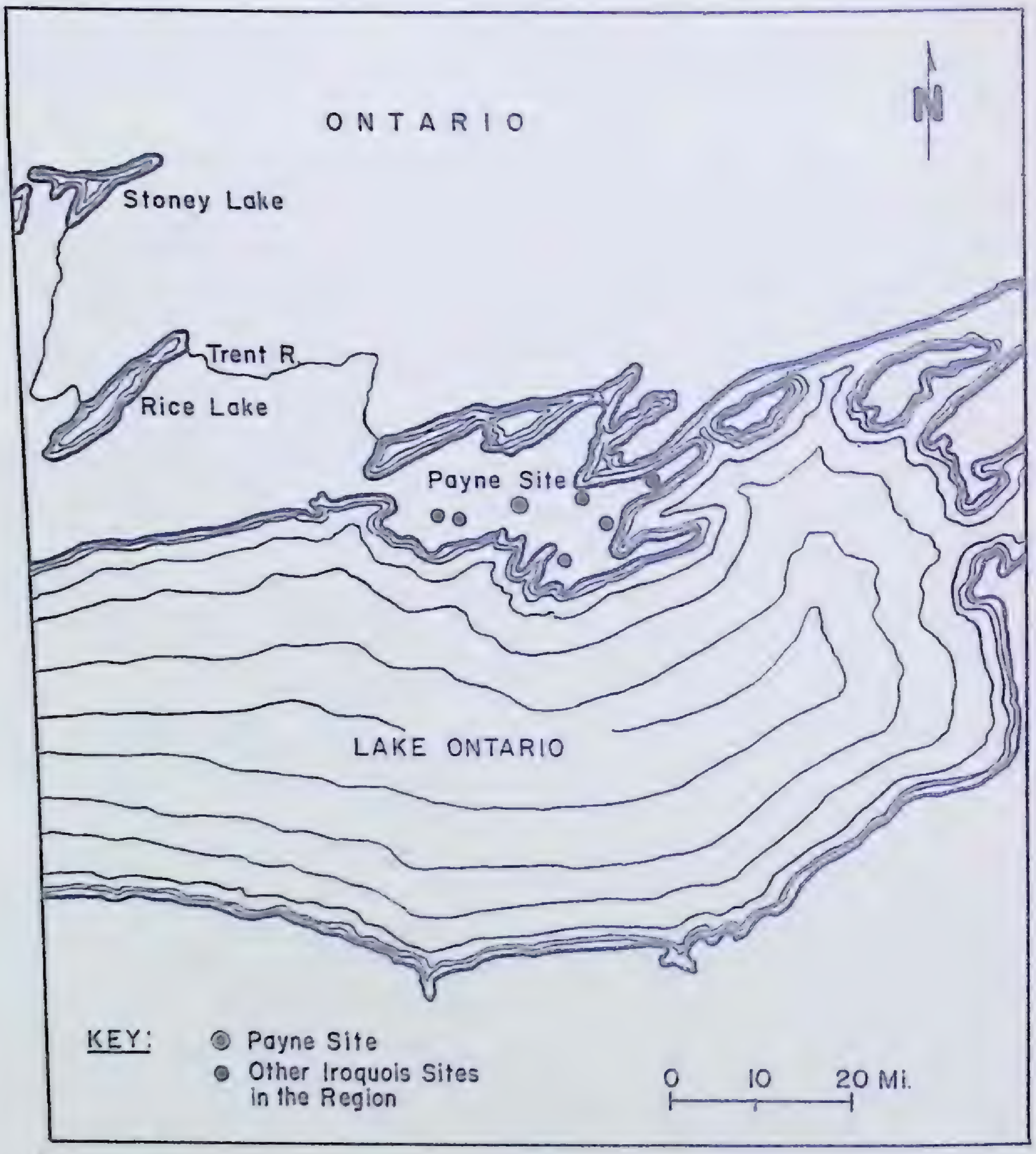


FIGURE 1—*Prince Edward County Iroquois (Iroquoian) village sites*

I am grateful to the School Board of S.S. No. 9, Hallowell Township, for providing camping and other facilities. This added considerably to the comfort and convenience of the crew in their work. The Provincial Department of Highways very kindly lent picnic tables which provided further comfort and efficiency in camp.

The excavation was financed directly by a provincial government grant from the Department of Education to the Department of Anthropology of the University of Toronto, and indirectly by the National Museum of Canada, which contributed a field vehicle and the services of Mr. Richard Pearson as field assistant. Such joint excavations result in greater productivity and are of benefit to both institutions concerned.

I appreciate the National Museum's assistance in the field and also the subsequent support and encouragement its Chief Archaeologist, Dr. William E. Taylor Jr., gave to this work. Further I am grateful to Dr. Taylor for his valuable editorial advice.

The excavation of the Payne site was one of a series in a long-term archaeological research programme of the Department of Anthropology of the University of Toronto, administered by the late Professor T. F. McIlwraith, former Head of the Department, and carried out by myself as Supervisor of Archaeological Studies for the Department.

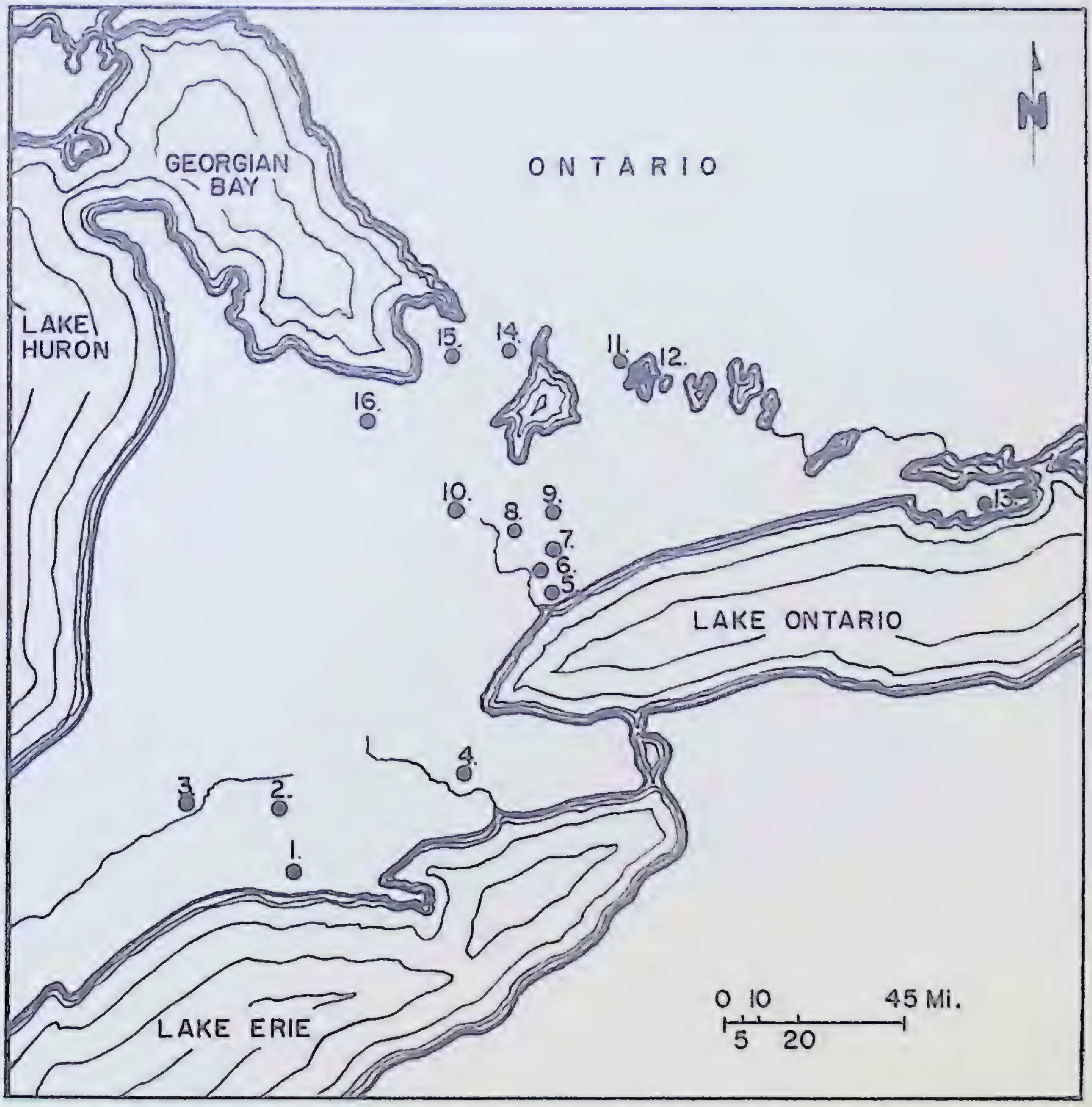


FIGURE 2—*Ontario Iroquois sites used for comparative analysis*

1. Uren
2. Pound
3. Lawson
4. Middleport
5. Black Creek
6. Downsview
7. Parsons
8. McKenzie
9. Aurora
10. Bosomworth
11. Benson
12. Hardrock
13. Payne
14. Warminster
15. Orr Lake
16. Sidey-Mackay

METHOD

This report seeks more than a simple descriptive account of the field operations and the archaeological data encountered at the Payne village site. In constructing the history and culture of this particular small segment of the Iroquoian people it follows the comparative method so characteristic of anthropological studies.

In comparisons I will lean heavily on the comprehensive site reports of the late William J. Wintemberg, formerly Archaeologist of the National Museum of Canada. These data comprehend Wintemberg's findings at Uren (20), Lawson (22), Middleport (24), Sidey-Mackay (23), and Roebuck (21) sites. In addition, I have used data accumulated by the Departmental research programme in York, Simcoe, and Victoria counties. Much of this data has been reported in my doctoral thesis for the University of Chicago (3), which includes a summary of the Black Creek, Downsview, McKenzie, Aurora, Hardrock, and Benson sites (*see* Figure 2). Reference from time to time will also be made to unpublished information in my possession. The ceramic analysis follows the lead given by Dr. R. S. MacNeish in his *Iroquois Pottery Types* (11).

The factual and mathematical data in this report are largely the work of Mr. Richard Pearson. Mr. Peter Harrison assembled the data on the ceramic pipes. Many of the initial interpretations of the Payne site were first submitted by Pearson as an archaeological project for Professor William Mayer-Oakes, formerly of the Department of Anthropology, University of Toronto. These initial interpretations have been modified and revised, but they are a useful and organized beginning point (12).

THE SITE AREA

The Payne site is located in Lot 14, Concession 2, northwest of West Lake, Hallowell Township, Prince Edward County. It rests on the sunny bank of a small stream on fertile, well-drained, sandy soil, readily adaptable to agricultural activities. The ground slopes gently and is relatively smooth. The site occupies 9,000 square feet, 10 per cent of which was investigated. The upper or eastern section is composed of fine yellow sand which changes rapidly and radically to a dense wet clay as the lower western slope is reached. In this area, lush grass grows, and here cattle now graze during the summer months. A moist depression to the west of the site sustains a large clump of willow. Local residents remember the time when carp and other fish were found in pools among the willows, particularly during wet spring seasons, before the final clearing of the forest.

In the wider context of Prince Edward County, the Payne site is one of seven Iroquois villages encountered by the survey party (*see* Figure 1). Like the others, it appears to be located somewhat centrally, 6 miles inland from Wellington Bay. Prince Edward County is a peninsula characterized by long inlets, tenuous bays, and long finger-like peninsulas on both its eastern and western shores. The central portions of the county, on a southeast-northwest axis, are the most likely areas for overland travel. Within limits, it would

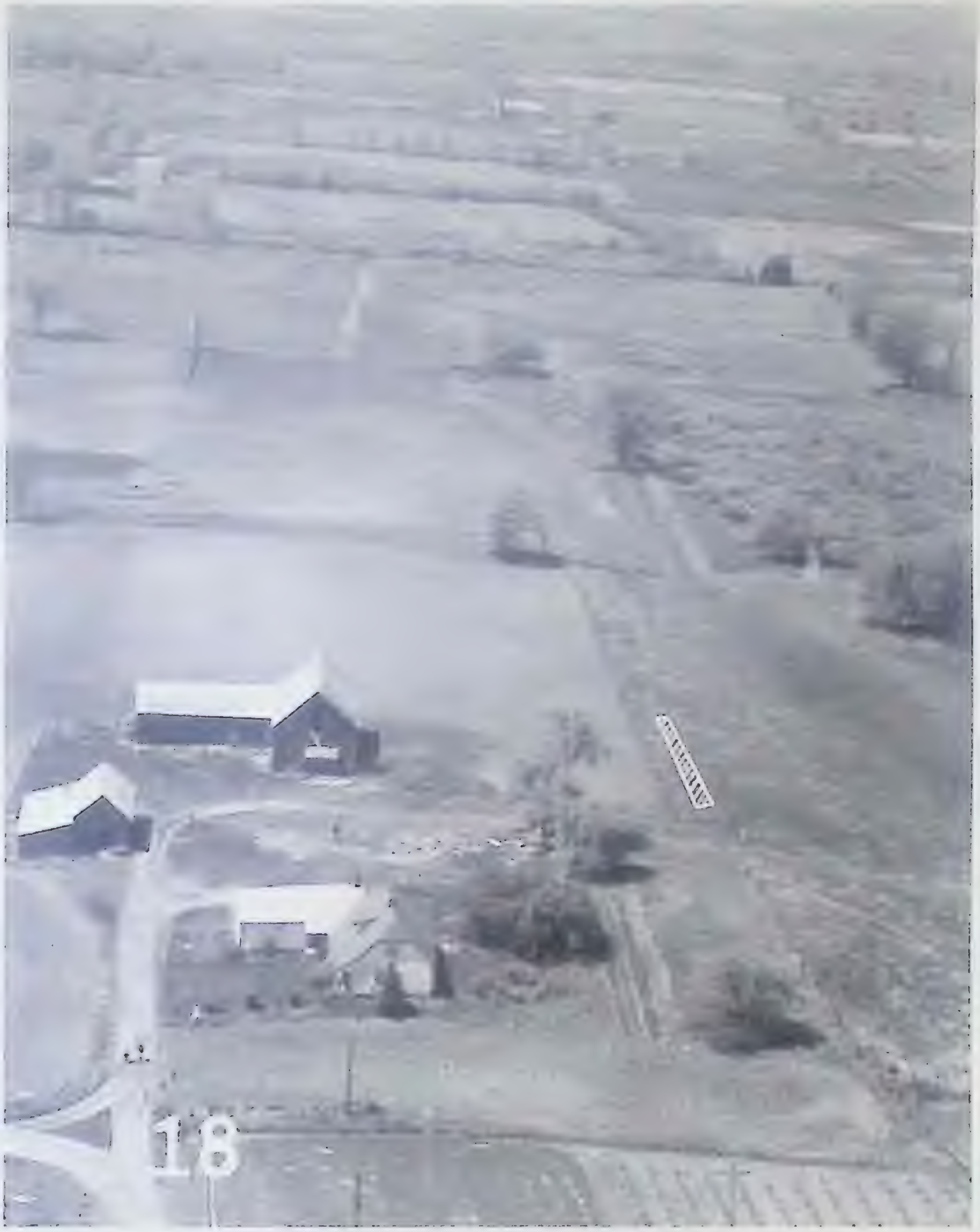


FIGURE 3—*Site map, location of 1958 excavations*

appear that this is the locus of Indian settlement. The few sites near the water and the sand dune region in the southwest of the county may well have been seasonal fishing stations.

It was of interest that the survey did not produce the wealth of sites expected in the light of Prince Edward County's evident historical importance. The search for historic villages, such as Kenté, in particular, was most unrewarding.

Finally, the Payne site must be seen in the broader context of Ontario and northeastern prehistory. It is located at the southern end of the Trent Waterway and is part of the Iroquois occupation area; there can be little doubt that it was on or near a travel route to the Iroquois populations of eastern New York. There may also have been connections with the Iroquois groups in the South Nation watershed to the northeast. Such relationships are taken into consideration in analysis of the archaeological data.

THE ARCHAEOLOGICAL DATA

On excavation, the Payne site proved to be only moderately productive in comparison with other Iroquoian village sites. For example, each square yielded an average of only one hundred sherds. Eleven hundred square feet of the site were excavated. Pottery was the most common and most informative material encountered, but the bone and stone artifacts recovered, although sparse, provide useful clues for understanding the site.

In general, apart from the pottery, the artifacts involved a very discouraging task of analysis; they were sparse, small, and broken and had few diagnostic features. Exotic or unusual pieces were almost non-existent. Thus the task of drawing extensive conclusions from them was most difficult. The following outline of bone and stone artifacts must, of necessity, appear sketchy.

Bone Artifacts

The catalogue of these items includes the following:

45 bone awls
33 bone beads
8 animal incisor tools
1 cut deer mandible
1 antler flaking tool
1 medicine tube
7 worked deer phalanges
2 bone gorges
1 triangular bone projectile point

The bone awls were all of the splinter type and were ground to a sharp point and gently tapered. None possessed either the distal or proximal ends of the bones to allow identification. The longest awl was $4\frac{1}{16}$ inches long with a maximum width of $\frac{1}{2}$ inch. The smallest was $1\frac{5}{8}$ inches long and $\frac{5}{8}$ inch wide. The latter was so small as to suggest that it had outlived its usefulness. In general the awls were in no way distinctive from those encountered on other Ontario Iroquois sites.

The same is true of the bone beads. A series of beads was measured showing a length range between $\frac{7}{8}$ inch and 2 inches and a diameter range between $\frac{1}{4}$ inch and $\frac{5}{8}$ inch. The beads appear to have been shaped to a given length by a grinding or sawing process rather than by cutting. One specimen was ground only part way through, and the edges, already severed, were quite smooth rather than incised. A study of the relationship between the length and diameter of the beads produced the observation that a ratio of 3 to 1, or 4 to 1, was most characteristic. This suggested that it was desirable for all beads to have a certain proportion.

The eight animal incisor tools were made from the sharp teeth of beaver and muskrat, which were split; probably, they were used as small chisels and engraving tools. Such tools have a wide distribution in Ontario Iroquois sites and are of little diagnostic value.

One deer mandible scraper that had been made from the lower right fragment of the mandible was encountered. The bone was broken off just posterior to the fifth cheek tooth and anterior to the ascending ramus. Such instruments have been referred to as "corn cob scrapers" by Wintemberg (21, p. 48) and would appear appropriate for the task. In the near absence of corn at the Payne site, this function appears doubtful. Roebuck is the only other site where these objects have been excavated and noted for Ontario.

The item believed to be a fragment of a medicine tube is a piece of highly polished bone 1⅝ inches long, ½ inch wide, and ¼ inch thick. The unsplintered end is rounded and highly polished, and the exterior has a decoration motif made of four incised encircling horizontal lines. The fragment is too thick, too heavy, too much polished, and too much decorated to fall into the bead category. Therefore it has been suggested that it is a shaman's or medicine man's tube. Such a specimen is rare. A single, nearly complete, and elaborately carved specimen came from the Hardrock site on Balsam Lake. Mr. John Steele of Hamilton and the late Rutherford Smith of Mount Hope had such long tube-like items in their collections. These came from the Niagara Peninsula and may be related to the Seneca.

Seven worked deer phalanges were found. Only one of these was complete. One was of the cup-and-pin type; the others were of the toggle type (21, p. 68–72). The single cup-and-pin type toe bone was about 1¼ inches long; it was broken leaving the distal end intact. A small hole was drilled at this end into the marrow cavity.

All six of the toggle type deer toe bones had been ground flat on their posterior surfaces, exposing a portion of the marrow cavity; two at least had additional small circular holes drilled into the cavity. The anterior surface was also modified in each case. The only complete specimen had been ground but did not expose the marrow cavity. The nearly intact specimen was ground obliquely on the anterior surface, sloping toward the proximal end, and the cavity was well exposed. This specimen also had a small hole drilled into the posterior surface near the distal end. Two of the remaining distal fragments had been polished obliquely on each side to produce a slightly rounded, bevelled effect upon the anterior surface. The final specimen involving only a proximal fragment appears to have had the anterior surface exposed by a cutting process rather than by grinding.

The worked toe bone is a useful diagnostic artifact (*see* 21, p. 68–72). The cup-and-pin type occurs at almost all excavated Ontario Iroquois sites but occurs with a higher frequency in the earlier ones. This type is prominent at Uren. It is numerically and geographically concentrated in southwestern Ontario and may be considered diagnostic of both early and Neutral Iroquois sites. It is essentially cone-shaped and may well have been used in a game

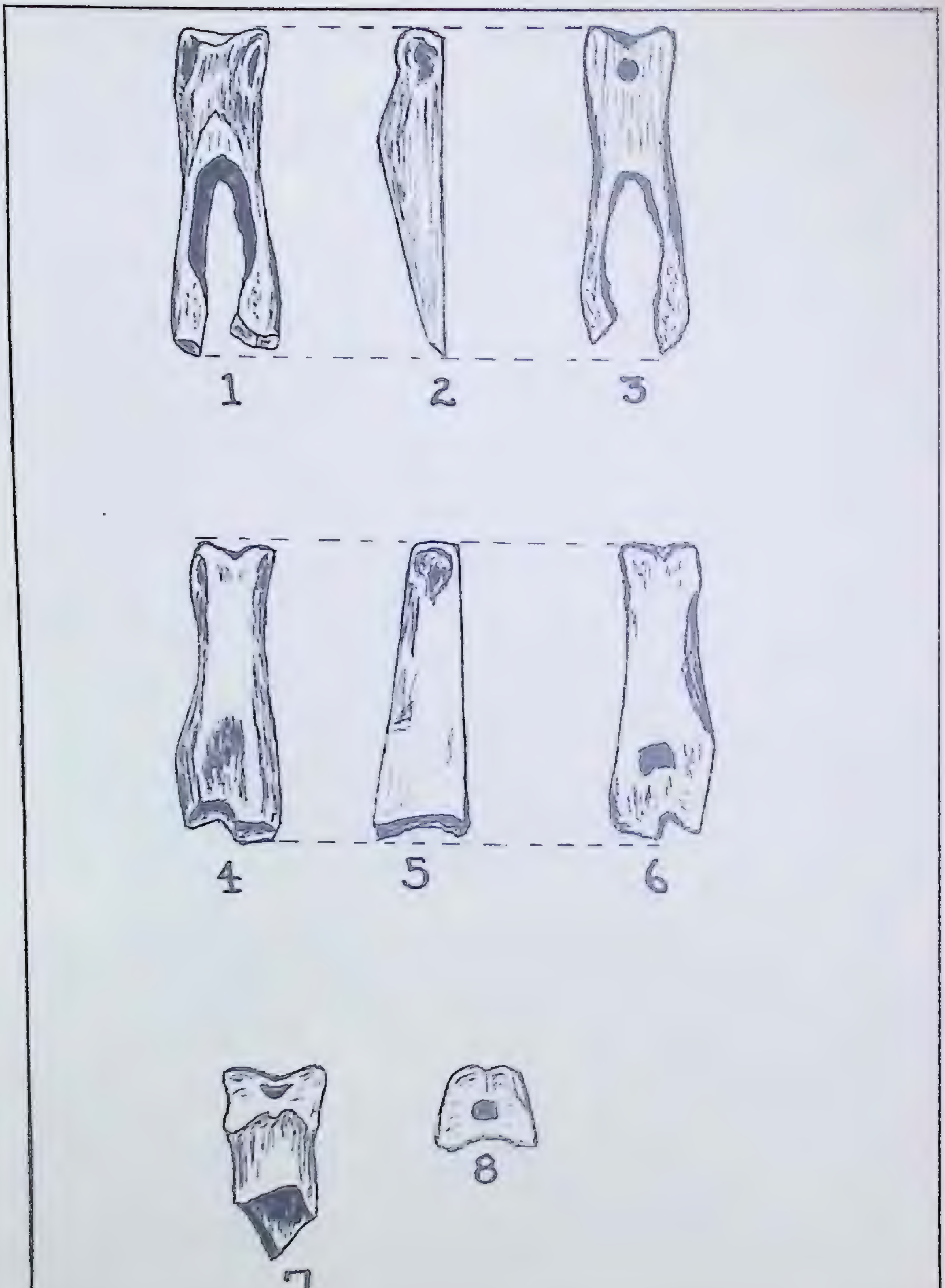


FIGURE 4—*Bone artifacts*

1–3. The superior, lateral, and inferior view of a ground toggle deer phalange

4–6. The superior, lateral, and inferior view of a ground toggle type deer phalange

7, 8. The inferior surface and the distal end of a drilled cup-and-pin game type of deer phalange

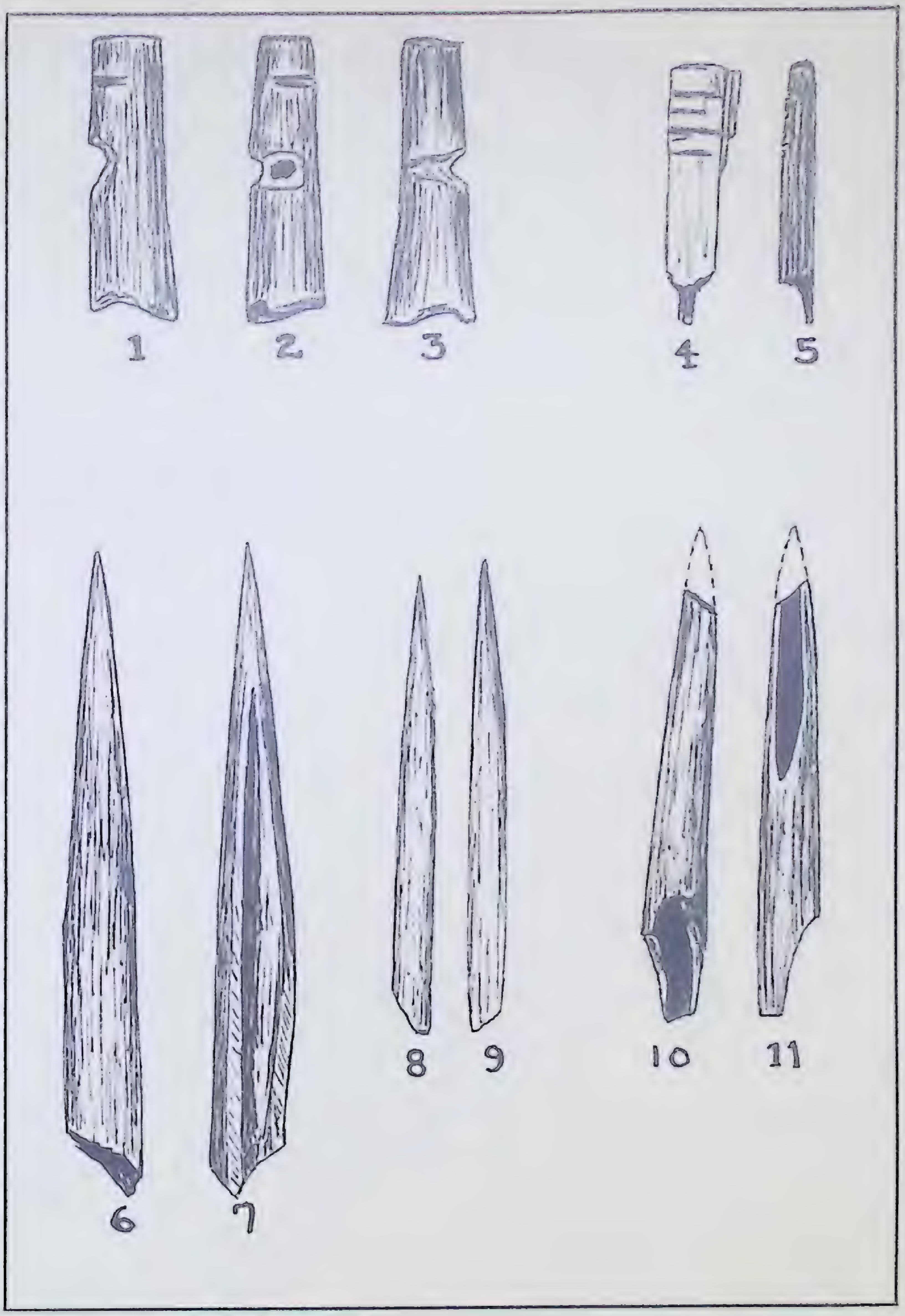


FIGURE 5—*Bone artifacts*

1–3. Views of the cut and drilled areas of the same bone tube
4, 5. Front and profile views of the polished and incised medicine tube
6, 7. The external and internal view of a splinter bone awl
8, 9. The external and internal view of a splinter bone awl
10, 11. Two views of a conical bone awl or projectile point

of skill where it was caught on the end of a pointed bone pin. Robert C. Dailey has studied this problem and notes that, although the game was reported from many surrounding tribes, there is little direct evidence to indicate it was played by the Iroquois (2).

The flattened type of deer phalange has also been found in many Ontario Iroquois sites, and its function is a matter of conjecture. It reaches its greatest popularity at the Roebuck site which is eastern Iroquois and labelled Onondaga-Oneida by MacNeish (11, p. 87). This type of toe bone also occurs at Black Creek, McKenzie, Aurora, Benson, Sidey-Mackay, and Hardrock (3). Thus, in addition to having an eastern distribution, it is associated with all stages of developmental and historic Huron and is not found in the Neutral area of southwestern Ontario. Thus this artifact, as found at the Payne site, emphasizes and suggests Huron connections and real, but slight, connections with eastern Onondaga.

Two bone slivers, one about $1\frac{1}{2}$ inches and the other $1\frac{7}{8}$ inches long, were found and classified as bone gorges. They had been ground to a point at each end. Gorges are seldom found in Ontario Iroquois sites but have a long history of occurrence at pre-Iroquoian sites in the northeast in both bone and native copper (18).

The single bone projectile point is in the form of an isosceles triangle. Such bone points are quite rare, but when they are found they appear to be from about the time period of Black Creek (3). This may be related to the suggestion that the Neutrals controlled the flint source, and at times this commodity was in scant supply, thus making it necessary to use bone in its place. This is particularly true of the Black Creek site where both conical bone points and flat side-notched triangular points, simulating the flint forms, were found. Thus the point at Payne may suggest a similar condition. Only three flint projectile points were found, and these were also of a Black Creek type described below.

The absence of certain key bone artifacts from the Payne series is also of importance. For example, the very characteristic and diagnostic whistles, carved bone needles, and the simple, single-pronged combs found in the Neutral area (24, p. 71, 73) did not occur, suggesting that Payne is not related to the early Neutral series. Further, there were no human skull gorgets or deer femur ball pendants such as are found particularly at the McKenzie and Lawson sites (22, p. 87, 89). These are typical of the middle and late prehistoric Iroquois periods and suggest Payne's occurrence in time before McKenzie rather than later. Moreover, Payne does not share the elaborate bone complex of Roebuck with multi-pronged combs, barbed harpoon points, fish spears, and antler knife blades (21, p. 132, 159, 161).

In summary, a consideration of the bone artifacts forms a basis for a preliminary assessment of the historical position of the Payne site; namely, that the closest resemblances lie with the Iroquois sites to the west, and of these the relationship appears closest to the Black Creek site in the lower Humber Valley.

Stone, Shell, and Miscellaneous Artifacts

Artifacts of these materials recovered from the site were sparse and badly fractured. The inventory includes the following items:

3 steatite beads
3 red ochre pellets
3 projectile points
3 scrapers
1 hammerstone
1 stone and 7 gaming discs
2 adze blades
1 chisel blade
8 shell beads
1 copper bead
1 slate knife

This is scarcely an impressive assemblage. But again such paucity and the shattered nature of the material are characteristic of sites which occurred shortly after the Uren-Middleport stage. Iroquois stone tools are seldom distinctive or diagnostic, with certain notable exceptions such as projectile points and gaming discs (21, p. 66–68). Three projectile points, all of the elongated, triangular, stemmed side-notched variety, were found. They are most numerous on middle Iroquois period sites and are particularly characteristic of the Black Creek and Downsview sites. This suggests a middle period status for the Payne site. The earlier triangular points with serrated edges and the later 'shouldered' Huron types (3) are absent. This again emphasizes the middle period position of Payne.

Seven pottery discs and the one stone gaming disc may be discussed as one item. These discs were all circular, like checkers, but their edges were pecked rather than ground. They varied from 1¼ inches to 1½ inches in diameter and were ⅜ inch to ½ inch thick. One was ⅞ inch thick. This latter measurement is unusual. Gaming discs do occur throughout the Iroquois area; they are sparse at both the Uren-Middleport and later Neutral sites and very abundant at Roebuck (21, p. 66–68) and at the Benson site (3). This would suggest that the item is both eastern and late prehistoric and historic Iroquois in occurrence. The Payne site may participate in the beginning of the gaming complex.

The three steatite beads were well made, about ⅜ inch long and ⅜ inch in diameter. The suspension hole was produced by counterdrilling from each side. Such beads are not particularly diagnostic, and a few occur at most Ontario Iroquois sites. The same is true for the one tubular shell bead, the single native copper bead, and the seven discoidal shell beads also found at Payne.

Three red ochre pellets which probably served as raw material for paint pigments used to decorate the face and body were found. Unusual pottery, painted red, was found at Payne; the red ochre could also well have served this purpose.

A final item was a ground slate knife blade with broken tip and base. Such a blade is more at home in the much earlier Laurentian Culture. A number of Laurentian blades occur in the Prince Edward County collections.

It is doubtful that this item had any direct relationship with the Payne site people unless it was re-utilized.

Three woodworking tools made from micaceous schist were discovered: one is an adze; another is an adze reworked to a chisel; the third appears to be an adze fragment. The well-formed adze is 2⅞ inches long, 1¼ inches wide tapering to 1 inch, and ¾ inch thick at the thickest point. This form of adze, which can be described as small and trianguloid, is restricted to early Iroquois sites such as Uren and Middleport. The adze fragment and the one made into a chisel are large. The chisel is 4⅛ inches long and ¾ inch thick, and its blade is 1½ inches wide (*see* Plate IV, fig. 4). It appears to have been produced by sawing a normal-sized adze into strips and by further grinding and sharpening these strips to produce blades.

Thus the stone assemblage points to the conclusion that the artifacts link the Payne site temporarily to Black Creek, and in general to sites called 'developmental' Huron.

PAYNE CERAMICS

Among the Iroquois people the production of a pottery vessel was a complex task involving technological and artistic considerations. Vessels possessed a restricted variety of forms. They were decorated with a characteristic series of motifs by using rather definite design techniques. MacNeish has demonstrated that certain attributes of form and design can be conceived as a 'pottery type' possessing a limited distribution in time and space (11, p. 2–7). Pottery types have value for historical construction and the delineation of cultural interrelationships.

Traditionalism and conservatism are constantly evident in Iroquois ceramics. The pottery follows a common and traditional mould as regards form and decoration. There is little evidence of experimentation or individual artistic expression. Few fragments appear to have been produced either by a person of exceptional talent or by one possessing little. It is this conservative standardization which permits the typing of Iroquois pottery.

Payne middens yielded 4,060 fragments of pottery. This represents about one hundred specimens from each excavated square. As I have suggested, the site can be considered only a moderately rich one. The following table includes the items of pottery found on the site:

TABLE 1

PERCENTAGE DISTRIBUTION OF POTTERY FRAGMENTS

	Number	Percentage
Analysable rims	259	6.37
Unanalysable rims	489	12.04
Neck fragments	423	10.41
Shoulder sherds	153	3.86
Decorated body sherds	142	3.49
Plain body sherds	2,550	62.80
Seed pot sherds	44	1.08
TOTALS	4,060	100.05

(A) Analysis of Rim Form

The rim sherds were carefully studied from the point of view of form. The interior curvature was particularly noted. Many rims were deeply concave, others were convex, and a number were nearly vertical when viewed in cross-section profile. Subtle differences were also observed in the exterior curvature of the rim collar. Here again, the exterior collar curvature could be described as convex (or rounded), straight, or concave. The base of the collar was also studied to see whether it was sharply defined by a clear-cut, ridged effect, or whether it was so poorly defined and rounded that it was difficult to delineate. In general, the lip seems to have received no distinctive treatment. In a few cases, however, this area was either expanded or constricted in such a way as to produce a distinctive form. Once these individual form variations had been observed, it was then possible to assemble them into groups of rim sherds that shared a number of features, thus constituting a 'form type.' For example, one series might include all those rims with a well-defined collar having a concave exterior contour, and a convex interior rim contour. A second distinctive series might include all rims which showed a poorly defined, convex, rounded exterior collar contour, and a deeply concave (or 'channelled') interior rim curvature.

Two hundred and fifty-nine rim sherds were sufficiently complete to allow form analysis. Such analysis produced sixteen distinctive rim forms (*see* Figure 6). These forms are systematically ordered in their presentation. All those which appear first possess the feature of a concave or 'channelled' interior rim curvature (*see* A to H), whereas those which appear later in the chart have a convex interior rim curvature (*see especially* M to P). This order of presentation facilitates discussion because some of these features have diagnostic value as temporal, geographical, and tribal markers.

Form A (3.1%) 8 sherds

Only eight of the 259 rim sherds are in this group. These rim sherds are in a well-made shape with a distinctive and well-developed collar. The concave interior rim has the deep 'channelled' effect so characteristic of vessels found in the Neutral Iroquois area of southwestern Ontario (24, p. 11). It is a minor form at the Payne site.

Form B (13.5%) 35 sherds

The third most popular form at Payne, Form B, occurs on thirty-five of the rims studied. It also duplicates a Neutral-area type in that it has a well-developed collar and a concave, 'channelled' interior rim. It is certainly similar to Form A above and perhaps should be grouped with it. However, in general, the collar of Form B is higher, thinner, and more vertical than that of Form A, to the degree that I consider it distinctive. The ratio of collar height to collar thickness is about 1.5 for Form A and 2.5 for Form B.

Form C (22.8%) 59 sherds

This form, with clear diagnostic value, is one of the two most popular at the Payne site and is very characteristic of the Neutral area. It has a rounded, poorly developed collar base and a well-developed, concave, channelled interior rim. This latter effect is so distinctive and so characteristic that it

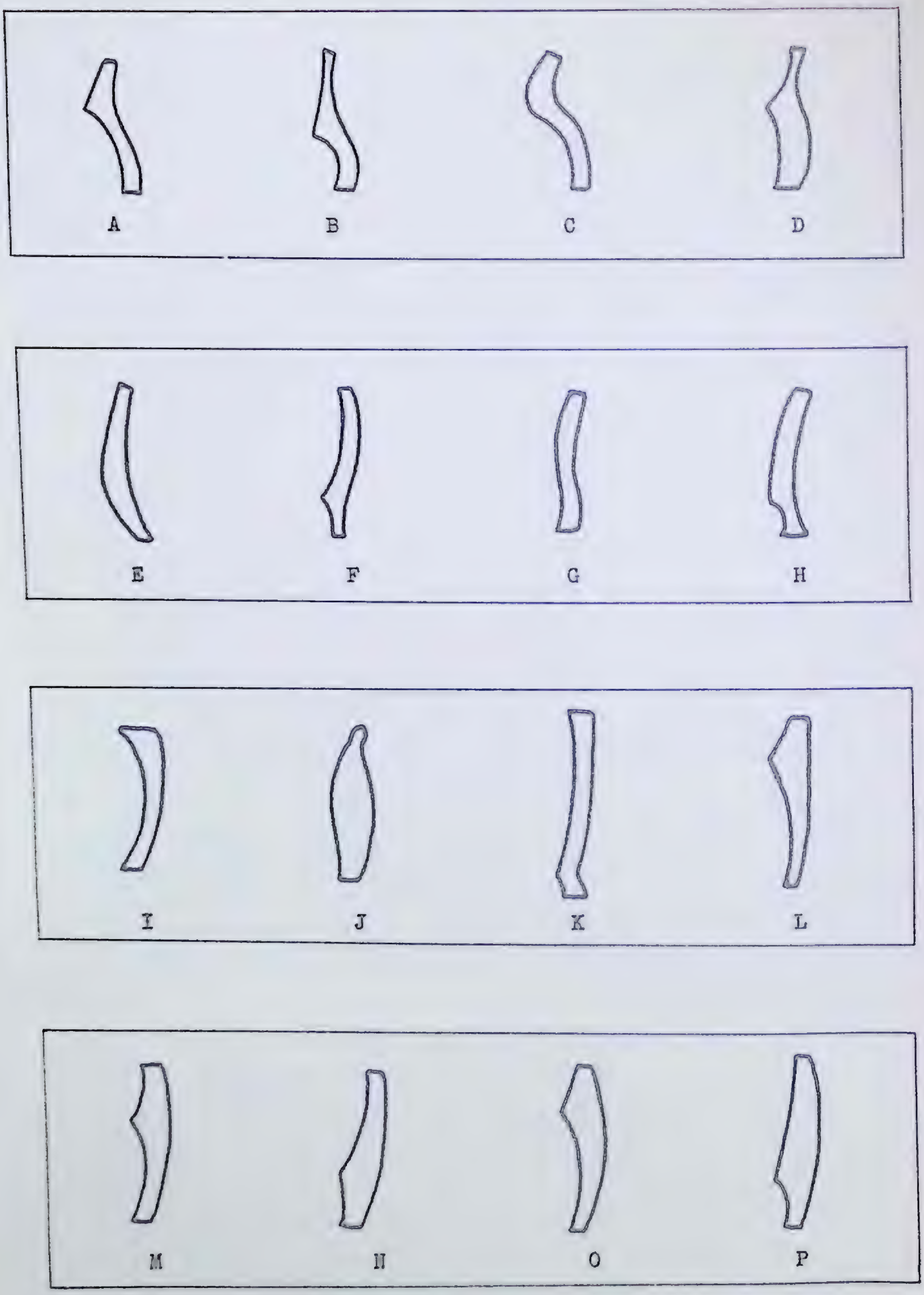


Figure 6—*Payne site—rim forms*

has been referred to as the 'rolled rim' variety (24, p. 11). It is an early period Iroquois form.

Form D (1.1%) 3 sherds

This well-made, artistic form was found on only three rims. A well-developed collar and the characteristic interior channelling are present. The deviant feature is the concave curvature on the exterior surface of the collar. Such a feature is seldom found in the early Neutral area. It does have some popularity at the Seed site in the lower Humber Valley where it is found as a form of variant of Seed Incised (11, p. 35).

Form E (12.2%) 32 sherds

This is the fourth most popular form at the Payne site. The rounded or poorly defined collar base and the concave interior rim relate it to the popular 'rolled rim' variety, Form C above. The interior curvature is much more gradual, however, and does not produce the sharply channelled nor the rolled and incurved effect so characteristic of Form C. Moreover, the rim appears more vertical in total contour. For these reasons I consider it distinctive.

Form F (.8%) 2 sherds

This is definitely a minor form in the sample. However, it is well known in the eastern Iroquois area where it is particularly associated with the pottery type known as Durfee Underlined (11, p. 60). Only two such rims were found at Payne. A relatively tall and well-developed collar is present, and the exterior collar concavity is quite pronounced. The interior curvature is almost S-shaped, the upper section is convex, and the lower portion is concave.

Form G (2.3%) 6 sherds

This is also a minority form at this location. Form G appears to be very closely related to Form E, and even to Form C above. It is characterized by a very poorly defined collar and a concave interior rim. The exterior curvature of the collar is the most deviant feature; it is more distinctively flat or vertical than the rounded forms of C and E.

Form H (2.7%) 7 sherds

This is again a minor form at Payne, and yet it is quite characteristic and distinctive. It is one associated with the eastern ceramic type, Durfee Underlined (11, p. 60). A relationship with the western New York ceramic type, Richmond Incised, is also apparent (11, p. 51). It has a relatively high collar with an interior concave rim curvature. Associated with this is a convex exterior curvature on a well-developed collar. The distinctive feature is the collar base which is clearly and sharply marked as the vessel contour rapidly constricts.

Form I (4.6%) 12 sherds

An expansion of the lip of the vessel, combined with the lack of a collar, characterizes this minor but distinctive form. Such a shape is more typically found in pre-Iroquoian sites in the northeastern archaeological area. It is, however, also found on Iroquois sites in New York State, particularly those identified as Seneca. At Payne, it is associated with a particular type of notched lip decoration. This association relates it to Dutch Hollow Notched, the Iroquois ceramic type popular in western New York State (11, p. 43).

Form J (.4%) 1 sherd

This form is, as far as I know, unique. It is simply included on the chance that it might occur as a more popular variant at some future excavation. Its most distinctive characteristic is the unique 'nubbin-like' treatment of the lip.

Form K (.8%) 2 sherds

This minor variant at Payne has the classic form features of Ridley's Lalonde High-Collared ceramic type (15). The collar of the rim is quite tall relative to its thickness, the ratio being about one to five, or one to seven. A well-developed and sharply defined collar is characteristic. The rim is nearly vertical with a definite interior channelling at a level even with the exterior base of the collar. Only two rims of this form were found at Payne. These two are not of the classic Lalonde High-Collared type, which is usually about eight centimetres in height, but are much shorter and can only be described as 'Lalonde-like.' A number of rims of comparable size and form have been reported by Popham (13) from Innisfil Township to the south of Kempenfeldt Bay.

Form L (1.6%) 4 sherds

With the consideration of this form one becomes involved in the distinction between Neutral and Huron ceramic types. In general, the introduction of well-developed collars, combined with convex interior rim curvature, is a diagnostic feature of Huron ceramics. Both of these features characterize Form L, which is represented by only four rim sherds. These should perhaps be included with Form O described below. On the whole, these rims are more vertical in profile, with a collar that is shorter in relation to the rim height than is usually found on the more classic Huron rims. For these reasons it is placed in this separate category.

Form M (3.1%) 8 sherds

This well-defined minority rim form is represented by only eight rim sherds. It has the Huron features of a well-defined collar and a convex interior rim. The distinctive feature is the concave exterior curvature of the collar. As suggested above, this particular attribute occurs on many rims found at the Seed site (11, p. 35).

Form N (5.4%) 14 sherds

This is also a definite Huron form. It is a relatively tall, delicately constructed rim. The collar is high but does not approach the Lalonde proportions. It is well formed with a concave exterior. The rim interior is convex. This form varies from Form M in its greater height and thinness of collar.

Form O (22.8%) 58 sherds

This particular form, involving 58 sherds, is, along with Form C described above, the most popular at the Payne site. It conforms to the classic Huron rim shape. Its well-developed collar is moderately thick, and the interior rim contour shows the typical convex curvature.

Form P (2.7%) 7 sherds

The seven rims of this form show basic Huron features. The interior is convex; the collar is tall and well defined. The most distinctive attributes are the height of the collar and the straightness of its exterior; otherwise, this form could be grouped with O and L.

In summary, the Payne site rim sherds exhibit a considerable diversity of form, more than is usually encountered on early Iroquois sites but less than is found on historic Huron sites. I am naturally concerned whether such diversity is the result of 'splitting' rather than 'lumping' the data in the process of analysis. I have suggested that perhaps forms such as A and B or M and N might be combined, but upon reflection have decided to leave them as discrete forms. This decision is based upon my experience in the separation of data (which, I have no doubt, is shared by many) that when a number of items are placed in a graded series, the end points in the series stand out as discretely definable entities. To combine them seems to distort the facts. Thus it is that I am convinced that the sixteen forms described above fairly represent the range of form at the Payne site.

The general Payne form features can be summarized as follows:

INTERIOR RIM CURVATURE	%	*See* forms:
Rim sherds with interior concavity	57.7	A B C D E G H
Rim sherds with interior convexity	35.6	L M N O P
Others	6.6	F I J K
Total	99.9	

COLLAR DEVELOPMENT		
Rim sherds with poorly defined collars	37.3	C E G
Rim sherds with well-defined collars	56.0	A B D H L M N O P
Others	6.6	F I J K
Total	99.9	

COLLAR DEVELOPMENT AND INTERIOR CURVATURE RELATED		
Rim sherds with interior concavity and poorly defined collars	37.3	C E G
Rim sherds with interior concavity and well-defined collars	20.4	A B D H
Rim sherds with interior convexity and well-defined collars	35.6	L M N O P
Others	6.6	F I J K
Total	99.9	

When these figures are seen in the light of a knowledge of Iroquois ceramic development, it becomes possible to draw useful conclusions with regard to the participation of the Payne site in that development. Broadly speaking, a survey of early Iroquois ceramics as manifest at the Uren (20) and Middleport (24) sites, when contrasted with the ceramics from Warminster (11) and Sidey-Mackay (23) sites, indicates that there are two major changes in form:

1. The interior curvature of the rim changed from concave to convex;
2. The collar of the vessel changed from a rounded, poorly defined one to a discrete, well-defined one.

In the light of these changes from early Uren-Middleport times to that of historic Huron, the Payne site clearly has an intermediate position. This can be demonstrated by comparing the percentage occurrence of Payne form features against an ideal picture of early and later Iroquois forms assuming a one hundred per cent purity of the ideal forms (a strictly hypothetical assumption):

	Ideal Early Iroquois Form		*Ideal Late Iroquois Form*
INTERIOR RIM CURVATURE			
Concave	100%	57%	0%
Convex	0%	35%	100%
COLLAR DEVELOPMENT			
Poorly Defined	100%	37%	0%
Well Defined	0%	56%	100%

In terms of these figures, Payne clearly has an intermediate position. The feature of interior rim curvature relates the Payne more closely to the Uren-Middleport ceramic tradition than to historic Huron, whereas the collar development suggests the reverse. It appears that changes in collar development are taking place more quickly than changes in interior rim curvature. When the percentage distributions of these two features are combined for consideration, their distributions show a remarkable balance, which again stresses the intermediate developmental position of the Payne ceramics.

Collar Development and Interior Rim Curvature

	%	
Concave interior and poorly defined collar	37.3	Early Feature
Concave interior and well-defined collar	20.4	
Convex interior and well-defined collar	35.6	Late Feature
Others	6.6	
Total	99.9	

Thus this study of rim form clearly establishes the middle Iroquois status of the Payne site. One may expect it to be located somewhere in the time range of Black Creek. However, the more complex and subtle problem of whether it comes before or after the Black Creek site in time must be answered by the more complex comparison of ceramic types, pipes, and castellations.

In summary, the Payne ceramics give evidence of form features which had their inception among the earlier western Iroquois sites in southwestern Ontario and also contain features which tend toward those which will become historic Huron in form. There is little evidence that influences were being felt from the eastern Iroquois area, such as the Roebuck site, or from sites in western New York State.

(B) Analysis of Hardness

The matters of colour and hardness in Iroquois ceramics have received little attention; when studied, they have not led to particularly significant observations. MacNeish, however, has brought to our attention that Neutral-Wenro and Onondaga potteries have a hardness of 2.5 and Huron pottery a hardness of 3.0 (11, p. 13, 32, 59).

Research carried out by Frederick Matson of the University of Michigan (8) has demonstrated that features of colour and hardness are a complex result of clays, firing temperatures, and contained impurities. All these should have diagnostic value. It was, therefore, with some optimism that I approached the study of the features of colour and hardness of the Payne ceramics.

To gather information on hardness, Pearson studied 238 rim sherds and 100 body sherds. This represented close to eight per cent of our pottery. Hardness was assessed according to the Moh scale as follows: 1.0 talc, 2.0 gypsum, 3.0 calcite, 4.0 fluorite, 5.0 apatite, and 6.0 steel.

Initial finding confirmed MacNeish's that Iroquois ceramics have an average hardness of 2.5 (11, p. 7). Findings of exterior hardness were as follows:

TABLE 2

FREQUENCY OF EXTERIOR HARDNESS

Exterior Hardness	All Sherds	Body Sherds	Rim Sherds
5	6	0	6
4	42	0	42
3	135	13	122
2	130	67	63
1	25	20	5
TOTALS	338	100	238

The average hardness for all the sherds studied is 2.62. This figure means little by itself. However, when it is noted that the hardness for rims is 2.92 in contrast to a hardness of 1.93 for body sherds, the deviation is suggestive. It appears that the rim sherds are definitely harder than the body sherds and are presumably more adequately fired. In so far as all the hardness tests had been made upon the exterior surfaces, it was now suggested that a comparison of interior versus exterior hardness might prove of interest. Pearson checked these data, and the observations are reproduced in Table 3.

TABLE 3

HARDNESS INDICES OF BODY AND RIM SHERDS

		INTERIOR						
		5.0	4.0	3.0	2.0	1.0		
EXTERIOR	5.0		2	1	1		4	4
	4.0	2	19	19	2		42	42
	3.0	1	12	69 2	42 10	1	124 13	173
	2.0		3	11	49 42	25	73 67	130
	1.0				1	5 19	5 20	25
		3	36	100 2	94 53	5 45	238 100	338
		3	36	102	147	50		

If for the moment one may assume that hardness is the product of only one variable, firing temperature, then it appears that in the majority of cases (61%) the inside and the outside of the vessel are fired to a similar heat. This is equally true whether rims (59%) or body sherds (63%) are considered. When a difference between interior and exterior is noted, it appears that the interior is likely to receive less heat, i.e., to be softer, in 30 per cent of the cases. In 9 per cent of the cases, however, the interior is harder.

A comparison of the rim and body sherds further illuminates this contrast. If one assumes that softness can be equated with less heat, then it appears that the interiors of body sherds are heated much less (36%) than average (30%), and rims are heated slightly more (28%) than average. Or, conversely, 9 per cent of interiors in general are heated more than exteriors, and 13 per cent of interior rims receive more heat; only 1 per cent of interior bodies receive more heat.

This difference in hardness can be accounted for by a theory of the method used in firing the pottery that would bring about the variations found. Ethnohistory does not provide any adequate description of Iroquois firing methods. Scientific studies, such as Matson's (8), do not provide specific information on the relationship between firing temperatures and hardness.

The evidence indicates that for firing the Iroquois inverted the pot on a supporting base of stones to raise it off the ground. The wood was piled up around the vessel in a conical form using green and slow-burning woods to raise the temperature gradually. The fire was then consistently fed, and the heat was increased by adding the hotter-burning hardwoods such as oak and elm.

With this method, rims would be harder than bodies because they would be closer to the accumulating bed of hot coals. Moreover, as the firing progressed, the spaces between the supporting rocks would become clogged with ashes so that less heat would reach the interior of the vessel. In the cases where body sherds are harder than rim sherds, it would seem that the vessel had been set upright to be fired.

To test firing conditions I constructed three pots and fired them as suggested above. The fire was started with willow and elm bark and gradually changed to hickory and finally to hot-burning red oak. In a period of three hours, the pots had been fired to a temperature of nearly 2,000°F, measured by Thermomelt pellets. The vessels glowed a cherry red inside and out. This firing seems to duplicate the uniformity of hardness which characterized the interior and exterior of some 60 per cent of the Payne sherds studied. Because of the relative smallness of the vessels I produced, in comparison to the size of the Iroquois ones, I was not able to obtain any significant hardness variations from one part of the vessel to the other.

It must be said, however, that for a few cases where the interiors are harder than the exteriors, an explanation by the above hypothesis does not appear possible. I have no solution to offer, but I intend to pursue further experiments in this field.

(C) Analysis of Colour

The research of Matson (8, p. 115–120) formed a basis for my colour study. He demonstrates a relationship between firing temperature and resultant colour for both levigated and natural clay samples. I recapitulate here his findings because they serve as an initial guide:

TABLE 4
FIRING TEMPERATURE AND COLOUR OF LEVIGATED AND NATURAL CLAY

Temperature °C	Colour		Temperature °F
	Levigated Clay	Natural Clay	
Air dried	Hair Brown	Smoke Gray	
400	Clove Brown	Mouse Gray	752
500	Drab	Drab	932
540	Drab	Wood Brown	1,004
600	Wood Brown	Wood Brown	1,112
740	Light Pinkish Cinnamon	Cinnamon	1,364
880	Vinaceous Cinnamon	Pinkish Cinnamon	1,616
940	Pinkish Cinnamon	Vinaceous Cinnamon	1,724
1,000	Ochraceous Salmon	Apricot Buff	1,832
1,040	Apricot Salmon	Cinnamon Rufous	1,904
1,100	Onion Skin Pink	Cinnamon Rufous	2,012
1,150	Chestnut Brown	Kaiser Brown	2,012

The colour terms follow those defined in Ridgway (14), and I have added the temperature range in Fahrenheit degrees because my experiments using Thermomelt indicators were measured in Fahrenheit. At this point, it would appear that analysis could proceed rapidly without difficulty: simply separate the sherds into colour categories, relate the colours to Ridgway's terminology, and in turn relate these to the appropriate firing temperatures. But the problem is not so simple. As Matson pointed out, it is quite difficult to equate Ridgway's colour plates with actual sherds which vary so much in texture (8, p. 103). Thus in the last analysis it was only possible to use the colour-temperature data as a general guide in evaluating the Payne material.

A sample of 342 rim and body sherds was checked for exterior and interior colour. The sherds were separated into a series of nine categories which most closely represented the colour range found in the sample. It was helpful to 'squint' at a specimen in order to eliminate the variations present in a given sherd and to assess its most generalized colour. The nine colour categories were arranged in a series beginning with black and grey-black and proceeding through a series of browns and yellow-browns to orange with the following results:

TABLE 5

FREQUENCY OF EXTERNAL SHERD COLOUR

Colour	All Sherds	Body Sherds	Rim Sherds
	%	%	%
Black	8.7 (30)	7.0 (7)	9.5 (23)
Gray-Black	3.2 (11)	11.0 (11)	0.0 (0)
Gray	1.7 (6)	0.0 (0)	2.5 (6)
Black-Brown	2.0 (7)	2.0 (2)	2.1 (5)
Gray-Brown	7.3 (25)	7.0 (7)	7.4 (18)
Brown	56.7 (191)	46.0 (46)	59.5 (145)
Yellow-Brown	4.9 (17)	11.0 (11)	2.5 (6)
Orange-Brown	8.7 (30)	12.0 (12)	7.4 (10)
Orange	7.3 (25)	4.0 (4)	8.7 (21)
TOTALS	100.5 (342)	100.0 (100)	99.6 (234)

The category I have called 'brown' appears to coincide with Matson's 'Wood Brown' series and suggests a firing temperature of 600°C for the majority of the Payne sherds (56.7%). This compares closely with the Young site data and Matson's general observations about pottery in the eastern United States when he says, "It seems probable that the sherds were originally fired at a temperature not exceeding 600 degrees C" (8, p. 115) based upon shrinkage studies. He also states that "All the colour effects can be produced at 600 'degrees C' (8, p. 119) and within a period that does not exceed one half hour at the very most" (8, p. 119).

Technologically speaking, firing in a wood fire at such a temperature is a relatively simple task. My own experiments with Thermomelt indicators showed that in twenty minutes a fire fed with commercial hickory charcoal reached a temperature of 427°C, and in seventy minutes it reached a temperature of 538°C. From this point, if the fire were shielded from air currents and fed hickory or elm, it would reach a temperature of about 600°C, and this could be maintained by adding fuel. However, I found that by using red oak and allowing the wind to fan the fire at will, the temperature rose to above 981°C but stayed below 1,093°C. (The indicators used were graduated in 200-degree units from 800 to 2,000°F.) The resultant colours produced were very light greys and buffs, somewhere in the 'Apricot Buff and Onion Skin Pink' series listed by Matson (8, p. 116).

My own experiments have been tentative and preliminary, but they do serve to indicate that Indians would have little if any difficulty firing vessels at the 600°C range and that one would expect deviations to be the exception rather than the rule. Such factors as the use of soft or green woods rather than hardwoods, or the effect of varying winds could well explain the deviations.

Fifty-seven per cent of all the sherds studied were brown on the outside, with an almost equal number varying from this norm; 22 per cent were darker, and 21 per cent were lighter. In general, the rim sherds were uniformly brown (60 per cent) and only 46 per cent of the body sherds were brown. It would appear that the rims had been subjected to a greater constancy of heat. The deviation in lightness and darkness of colour was almost the same for both body and rim sherds; body sherds varied 27 per cent in each direction, and 21 per cent of rims were darker and 19 per cent were lighter. These figures are tabulated below.

TABLE 6

VARIATION OF EXTERIOR SHERD COLOUR

	All Sherds	Body Sherds	Rim Sherds
	%	%	%
Darker	22	27	21
Brown Coloured	57	46	60
Lighter	21	27	19

The distribution of interior colour contrasted with exterior colour. These data are presented in Tables 9 and 10, and the observations are summarized in Tables 7 and 8 below.

TABLE 7

VARIATION OF INTERIOR SHERD COLOUR

	All Sherds	Body Sherds	Rim Sherds
	%	%	%
Darker	50	43	57
Brown Coloured	37	36	37
Lighter	13	21	6

TABLE 8

VARIATION BETWEEN INTERIOR AND EXTERIOR COLOUR

	All Sherds	Body Sherds	Rim Sherds
	%	%	%
Interior Lighter	13	13	13
Same Colour	44	57	31
Interior Darker	43	30	56

A general trend is quite clear in interior colour: a much smaller number (37%) are brown. This is true for both rims and body fragments. Further, the variation from brown is quite definitely in the direction of darker colours in all sherds. Fifty per cent of the total belong to the darker category as do 57 per cent of the rims. The number is still high in the case of the bodies, 43 per cent.

A similar trend toward darker colour is evident when the relationship between interior and exterior colours is studied. Forty-one per cent are the same colour inside and outside, and 43 per cent are darker on the inside. This is more true of the rims, where 56 per cent of the total have darker interiors.

In summary, the observations on colour distributions are consistent with the firing methods suggested by the hardness analysis; namely, that some 50 per cent of the vessels were fired at a temperature of almost 600°C and were uniformly fired inside and out, particularly the rims. Some of the vessels were apparently fired at temperatures as great as 1,000°C. Interiors in general and the interiors of rims in particular show a definite trend towards the darker colours, suggesting less exposure to heat and also a lack of oxygen to form carbon dioxide, thus leaving a black carbon deposit on the interior of the vessel. This is consistent with the inverted vessel theory.

Two additional factors must be considered with reference to the darker coloured vessels: the process of secondary firing, and function. Secondary firing was used by the Huron to produce the glossy black ware often found on their sites. Vessels that had been fired were greased and re-fired at a low, non-oxidizing temperature to produce a shiny black surface.

On a number of the rims from the Payne site the dark colour changed to a lighter shade at a uniform distance below the lip on the interior of the vessel. This would appear to be similar to the ring of encrusted scum which one can find on our own cooking pots. Thus, if a vessel were used for cooking rather than for storage, that section containing liquid would remain unchanged, but the upper edge could well become greasy, encrusted, and blackened in the process of cooking. Thus, function must be considered in any study of sherd colour analysis.

(D) Analysis of Collar Development

Measurements of collar height and thickness to determine whether a relationship existed between these two features constituted the next study. If certain ratios proved to be consistent, then it could be argued that the Iroquois potter did approach the manufacture of a vessel with a certain attitude of appropriate proportions in mind. Two hundred and thirty-one rim sherds were investigated.

Collar height varied between 5 and 51 mm. The median collar height was 16 mm. Approximately ninety per cent of the collars were between 10 and 30 mm thick, however. Generally speaking, collar height followed a normal, bell-shaped distribution curve with few, if any, exaggerations. In other words, the increase or decrease in collar height was a gradual process and probably a function of total size.

Collar width or thickness showed a similar distribution. Thickness varied between 6 and 19 mm, with a median width of 10 mm. Thickness also followed a normal distribution curve.

The results of these readings are tabulated to indicate the ratio between collar height and rim thickness.

TABLE 9
COLORATION OF BODY SHERDS

		INTERIOR COLOUR									
		BLACK	GRAY-BLACK	GRAY	BLACK-BROWN	GRAY-BROWN	BROWN	YELLOW-BROWN	ORANGE-BROWN	ORANGE	
EXTERIOR COLOUR	BLACK	5					1		1		7
	GRAY-BLACK	1	5				4	1			11
	GRAY										0
	BLACK-BROWN				1		1				2
	GRAY-BROWN	1			2	4					7
	BROWN	5		4	1	3	29	1	3		46
	YELLOW-BROWN	2			1	2	1	5			11
	ORANGE-BROWN	2	1	1	2				5	1	12
	ORANGE								1	3	4
		16	6	5	7	9	36	7	10	4	100

TABLE 10

COLORATION OF RIM SHERDS

		INTERIOR									
		BLACK	GRAY BLACK	GRAY	BLACK BROWN	GRAY BROWN	BROWN	YELLOW BROWN	ORANGE BROWN	ORANGE	
EXTERIOR	BLACK	13			1	1	8				23
	GRAY-BLACK										0
	GRAY	3					3				6
	BLACK-BROWN	2					2			1	5
	GRAY-BROWN	3	1	3	1	4	5		1		18
	BROWN	64		10	9	7	53		1	1	145
	YELLOW-BROWN								6		6
	ORANGE-BROWN	5		4		3	6				18
	ORANGE	3			1		12			5	21
		93	1	17	12	15	89	0	8	7	242

Certain ratios were evidently much preferred. The collar that is proportionally twice the thickness of the rim in height is the most popular and constitutes one-third of the rims studied. The next most common forms are those in which the collar height is either equal to, or one and one-half times the thickness of, the rim. These three categories make up about 75 per cent of the vessels. The final popular ratio is one to three, which includes 10 per cent of the sample. Thus, vessels which vary from a one-to-one ratio to a one-to-three ratio in their construction make up just over 90 per cent of the rims found. In the broad picture of Iroquois ceramics this certainly represents a

TABLE 11

COLLAR HEIGHT—RIM THICKNESS RATIOS

	Ratio	Number	Percentage
$\frac{\text{Collar Height}}{\text{Rim Thickness}} =$	.50	3	1.3
	.66	1	.4
	1.00	44	19.0
	1.50	49	21.2
	1.60	8	3.5
	2.00	76	32.9
	2.33	1	.4
	2.50	8	3.5
	3.00	25	10.8
	3.50	2	.8
	4.00	6	2.6
	4.50	1	.4
	5.00	4	1.7
	6.00	2	.8
	8.00	1	.4
	TOTALS	231	99.7

'low collared' ware in contrast to the relatively high collars which appear particularly on sites that produce Lalonde High-Collared type pottery (15).

One may also observe that the extreme deviations, either where the rim is thicker than the collar height, or where the collar is exceedingly tall, make up only 1 or 2 per cent of the total.

Unfortunately, I do not have data for comparison from other Iroquois sites. However, in time, perhaps other workers will assemble such information for study, and it may well happen that these ratios will prove helpful for temporal and spatial comparisons and afford a useful clue to historical construction.

From the viewpoint of cultural behaviour, these ratios are instructive. It would appear that the Indian potter at Payne never made a vessel less than 5 mm in thickness or more than 20 mm. This stands as a contrast both to very thick gross ware and to very delicate thin ware which have been found on other sites. The potter then, working within definite limits of thickness, is still bound by a rather circumscribed sense of proportion when fashioning the collar of the vessel, seldom producing one which ranges beyond a one-to-one, or one-to-three ratio.

It is not necessarily true, as suggested above, that the initial thickness of the vessel is the feature that triggers the concept of the final proportions. I would suspect rather that the potter approaches the manufacture of the vessel with a total conception of the finished product in mind, suggesting that all these features are interrelated in a single manufacturing process. However, clay is not a particularly malleable medium for construction; the very first steps will actually determine the ultimate size and shape, if the vessel is to have the form of a typical Iroquois pot.

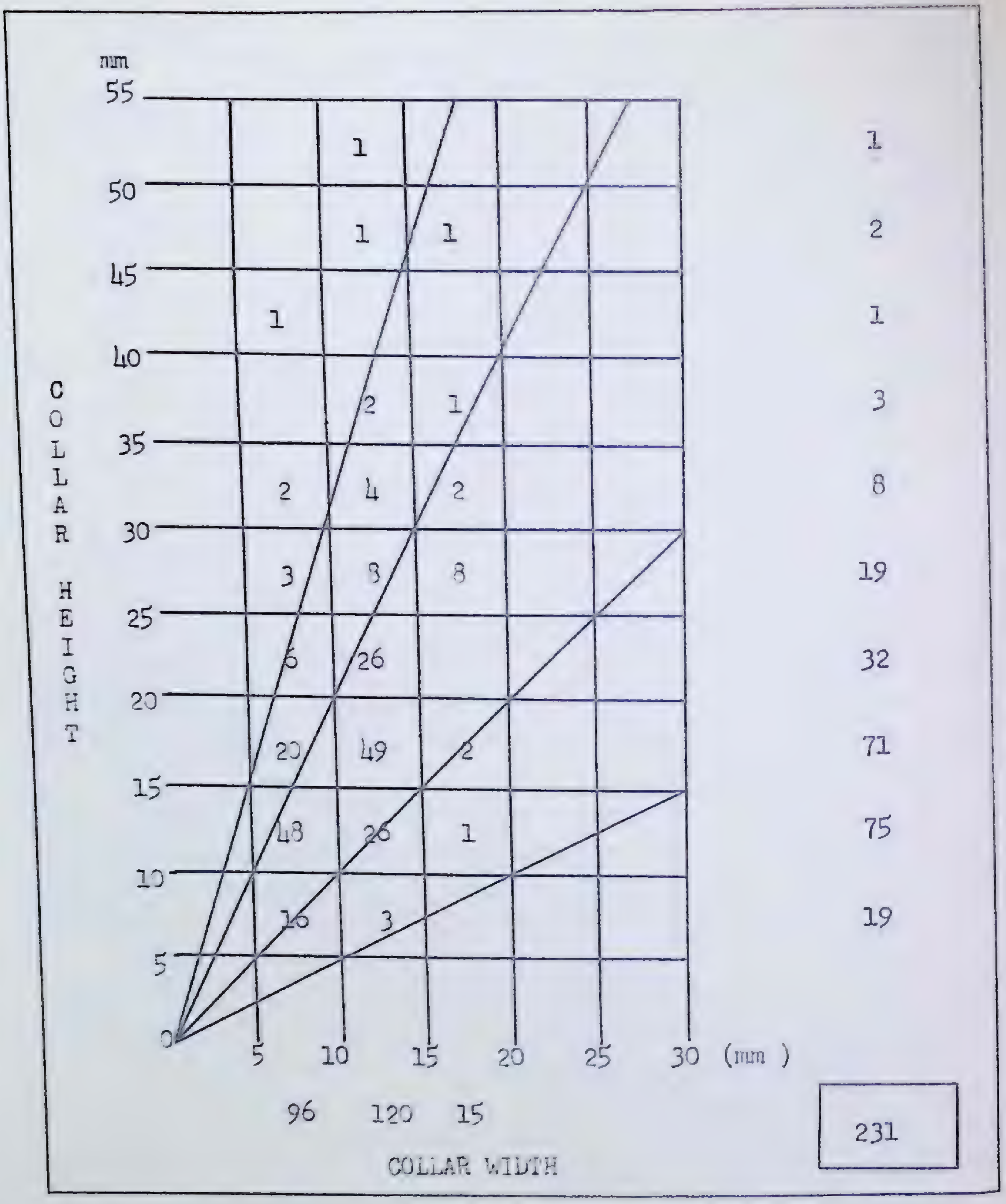


FIGURE 7—*Collar height and width ratios*

(E) Analysis of Shoulder Form

The study of pottery vessels shows that the shape of the shoulder varies between one which is called 'rounded' and one which is referred to as 'carinated.' The rounded form is much more common. On Wintemberg's sites, the following numbers of carinated shoulder sherds are mentioned: 208 at Roebuck, 45 at Middleport, 'a few' at Lawson, and only 8 at Sidey-Mackay. The suggestion here is that carination is an eastern Iroquois trait confined to the early and middle Iroquois periods, becoming more dominant in the latter, and that the rounded form is otherwise dominant and widespread.

At the Payne site, 153 shoulder sherds were studied. Of these, 87 were rounded and 66 carinated. This result (43 per cent carinated) suggests a strong influence of eastern Iroquois on the Payne vessel form. This is rather surprising in the light of the absence of eastern influences on the ceramics generally.

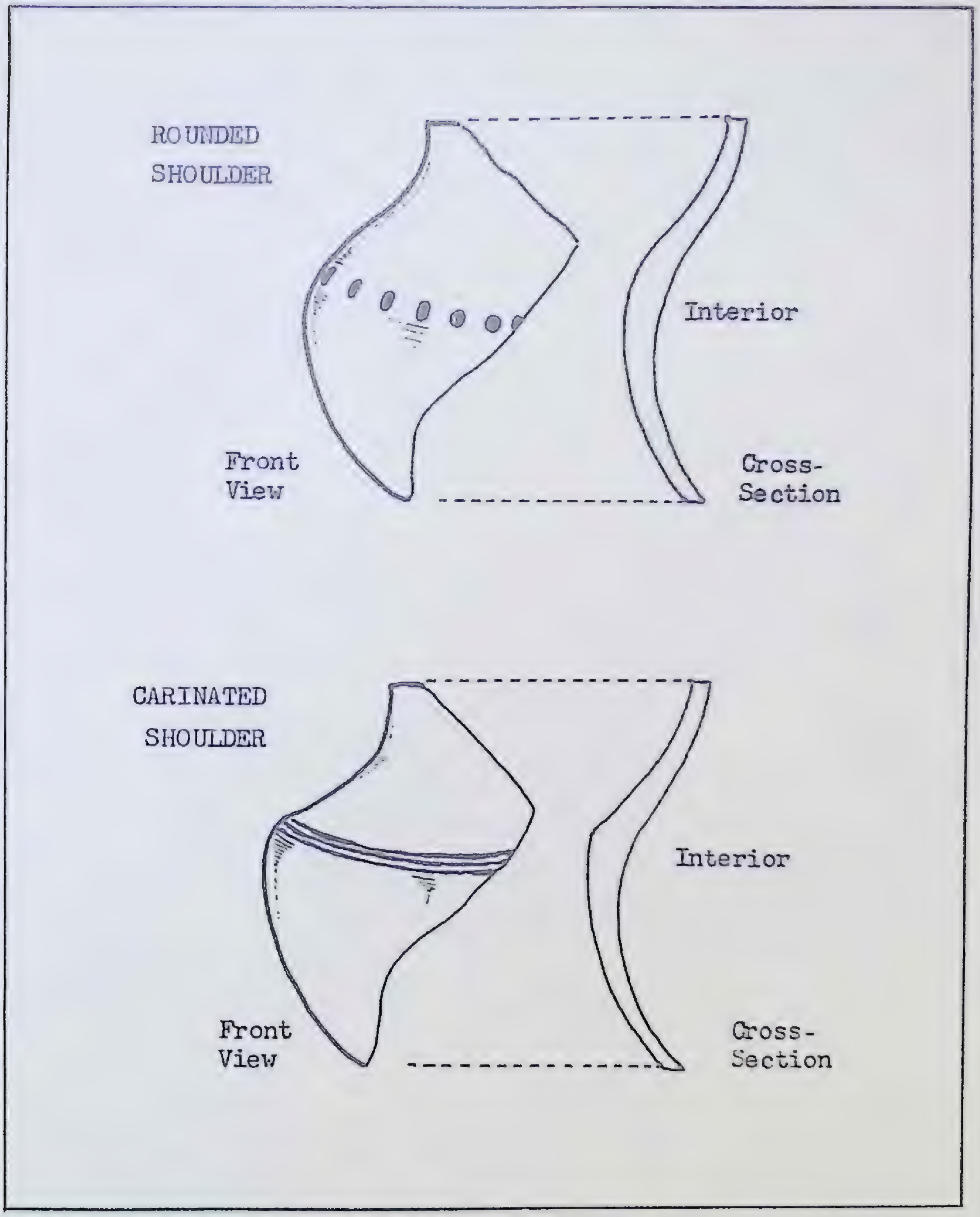


FIGURE 8—*Shoulder form variants*

(F) Body Sherd Decoration and Decorative Techniques

On Iroquois sites body sherds are usually undecorated. However, decoration does occur in a relatively low frequency. Two of the more popular variations are defined by Wintemberg as 'check-stamp' and 'ribbed-paddle' body treatment. The 'check-stamp' design is produced by impressing the clay with a paddle-shaped instrument that has been grooved in two directions, rather like a waffle iron. The 'ribbed-paddle' design seems to have been produced by drawing or trailing a paddle-like instrument, which has been grooved in one direction, across the surface. Possibly a multi-pronged comb drawn across the surface would produce a similar effect.

The distribution of these types of body treatment is of interest. At Uren 'many fragments' of each kind are found (20, p. 17). Almost 9 per cent, 1,700 out of 19,000 (24, p. 13), of the body sherds at the Middleport site exhibit ribbed-paddle design, but only nine sherds have check stamping. The reverse is true at Roebuck where 10 per cent, 1,100 out of 11,000 sherds, are check stamped (21, p. 43), and only 'some' show the ribbed-paddle design. With the exception of one check-stamped sherd from Lawson (22, p. 24), both such features are absent from the Lawson and Sidey-Mackay sites.

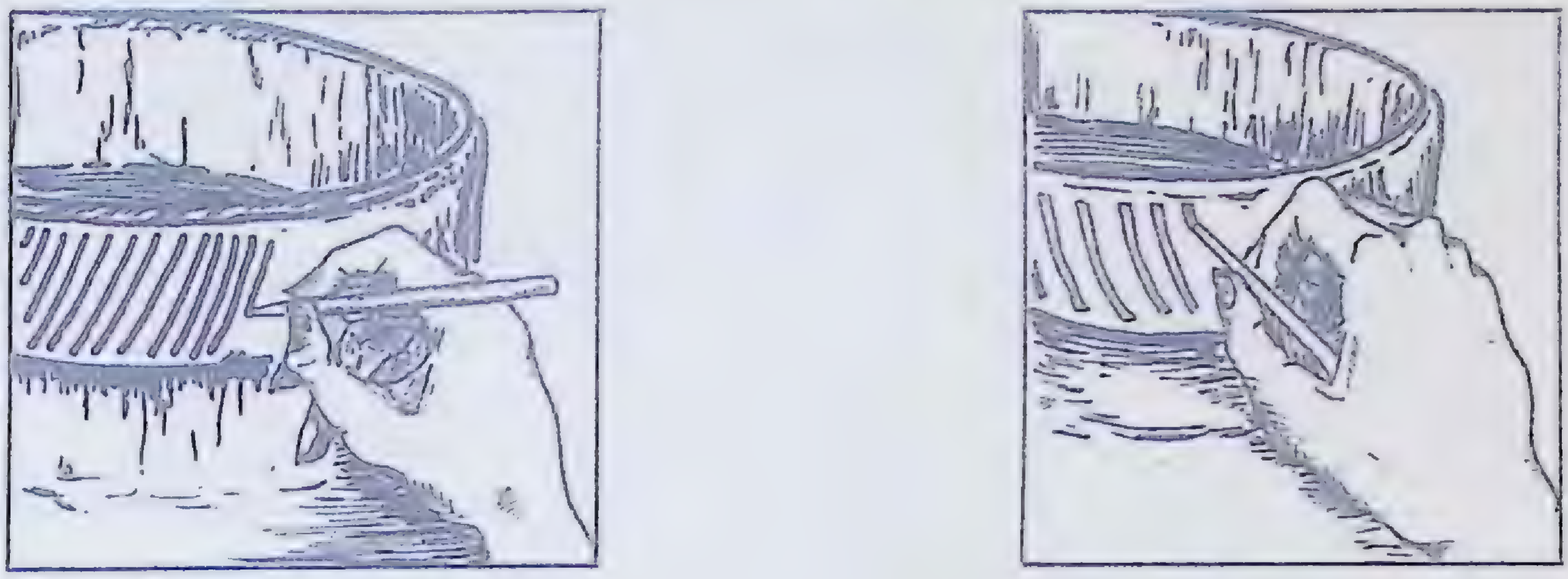
The above distribution would suggest that both techniques were popular on the earliest Iroquois sites such as Uren. Not long after this, however, by Middleport and Roebuck times, ribbed-paddle had developed into a western Iroquois technique, and check-stamp became a more favoured eastern Iroquois technique. By middle and contact Iroquois times both techniques had essentially disappeared.

At the Payne site only 5.27 per cent of the body sherds are decorated. This is a very small percentage. Of the total body sherds, none are ribbed-paddle, 3.27 per cent are check-stamp, and 2.00 per cent are incised. In general, the decoration of the body is an unimportant and insignificant part of the Payne ceramics. At best, they scarcely participate in the techniques which were popular at Roebuck or Middleport. The 3.27 per cent of ribbed-paddle design at Payne, as contrasted with 9.00 per cent at Uren, indicates that the design influence is western not eastern and that the technique is decreasing in popularity, suggesting that Payne must exist later in time also.

In the discussion which follows concerning Payne rim design motifs, reference is made to decorative techniques in explaining the designs. MacNeish (11) has, at times, been so impressed by a certain decorative technique that he has used it partially to identify a pottery type such as Huron *Incised* (11, p. 43), or Dutch Hollow *Notched* (11, p. 43). Thus, in preparation for future discussion, the following brief observations of the major decorative techniques found at the Payne site are offered. These techniques include incising, trailing, notching, and punctation.

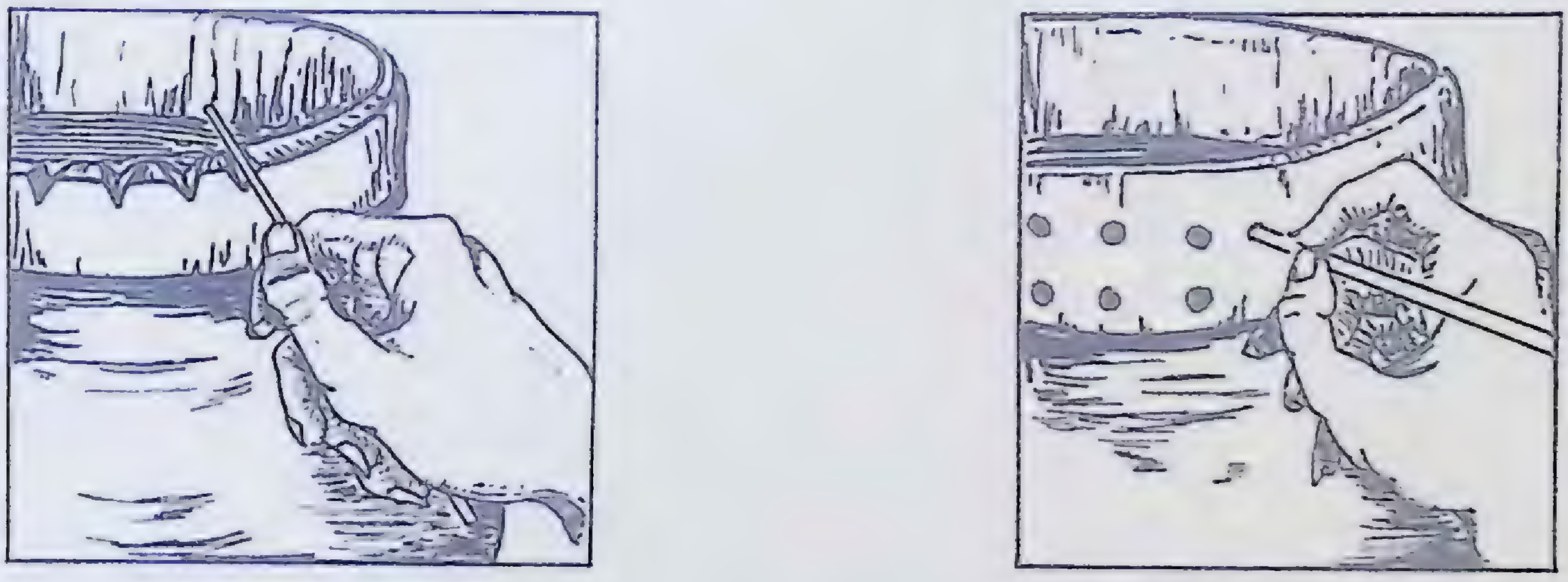
Incising (Figure 9a). Description of decorative techniques is naturally based on speculation and experimental attempts to duplicate the design characteristics in plasticine and clay. It appears that incising was done with a stylus-like instrument, probably the sharp bone awl such as is found on Iroquois sites. The designs are sharply etched and produce fairly deep oblique V-incisions in the wet clay.

Trailing (Figure 9b). Trailing is very much like incising, but it looks as if the stylus, instead of cutting sharply into the clay, has been laid on or slightly impressed into the clay and then drawn across the surface. This produces a somewhat rounded, trough-like impression rather than the V-like channel of incising. Moreover, little ridges of clay sometimes tend to pile up alongside the edges of the trailed area. So far, no studies have been carried out to determine whether certain villages preferred incising to trailing as a design technique. There has been a tendency to lump both under the incised category.



a. Incising

b. Trailing



c. Notching

d. Punctation

FIGURE 9—*Ceramic decorative techniques*

Notching (Figure 9c). Notching is a design technique used widely on middle and late period Iroquois sites. Ordinarily used to embellish other design techniques, it was also used by itself, being particularly popular among the Seneca (11, p. 38). Any areas of the rim which protrude, such as lip surfaces, lip edges, or the base of the collar, may be decorated by notching. The edge of the stylus appears to have been jabbed into, and drawn across, the surface. Some of the notches appear to be the result of impressing; others seem to have been made by a cutting or incising motion. It is often difficult to distinguish notching from incising when it occurs on the top of a rim. Usually, if it is shallow, it is considered incising; if it is relatively deep, it is notching. Notching was highly popular at the Roebuck site, especially collar notching (21, p. 139). Such pottery types as Dutch Hollow Notched have been defined, in part, on the basis of the distinctive application of this design technique (11, p. 43).

Punctation (Figue 9d). Like notching, punctation was mostly used as an embellishment to other design techniques, but it does occur by itself, often as a form of shoulder decoration. Punctation is produced by punching or stabbing the clay with variously shaped instruments held at different angles. Hollow bone tubes were probably used to produce the 'circular punctates' so characteristic of the Roebuck site (21, p. 147). Other instruments produce a multitude of forms: leaf-shaped, oval, wedge-shaped, and forms that defy classification. In this analysis (except for the distinctive Roebuck circular punctate), I have lumped the various strokes together and simply refer to them as 'punctates.' Except for Roebuck, research to date has revealed no significant punctates as being restricted to any particular stage of Iroquois development.

(G) Analysis of Design Motifs

The Iroquois have produced some of the most distinctive ceramics in North America by using a subtle combination of form and design. The designs are almost always geometric and were produced by incising, probably with a sharp-pointed bone instrument. The decorative lines were cut into the clay while it was still wet and malleable. Other minor techniques of decoration were also used.

Certain areas of the Iroquois vessel were more preferred for embellishment than others. I have noted that body decoration does occur, though it is rare. The rim is the favourite area for design motifs. The collar section most often bears design, the shoulder area next, and the neck the least, although even it is decorated in about one-third of the cases. Of the series studied, the distribution of decoration is indicated below.

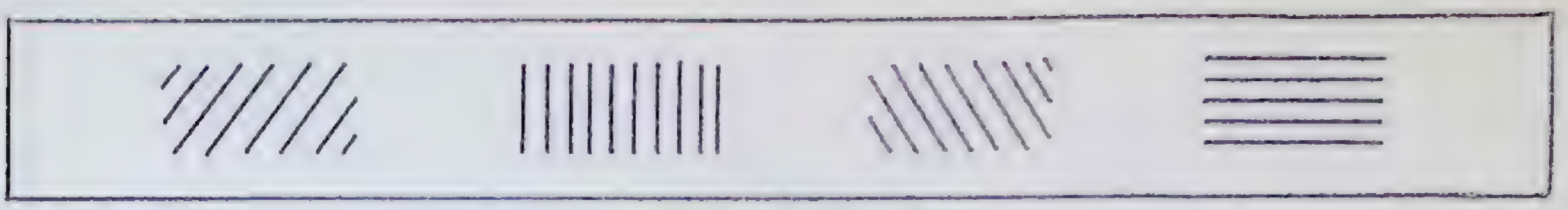
TABLE 12

FREQUENCY OF DECORATED RIM AREAS

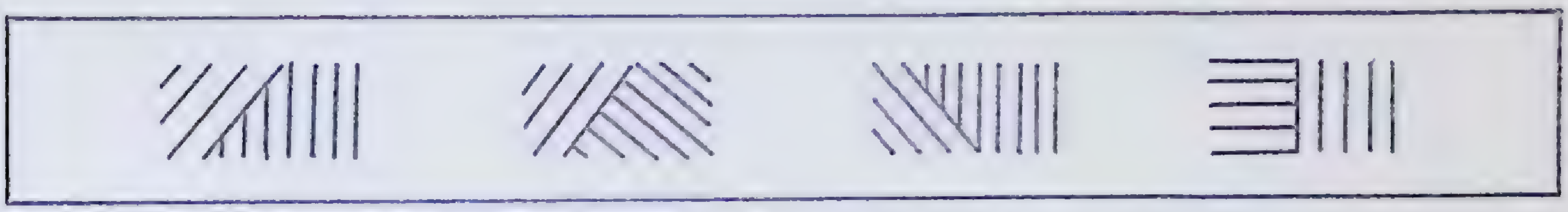
Areas	Decorated		Plain		Total
	No.	%	No	%	
Collars	243	95	12	5	255
Shoulders	140	91	13	9	153
Necks	83	33	172	77	255*
Necks	131	31	293	79	423**

*Sample associated with rim sherds intact.

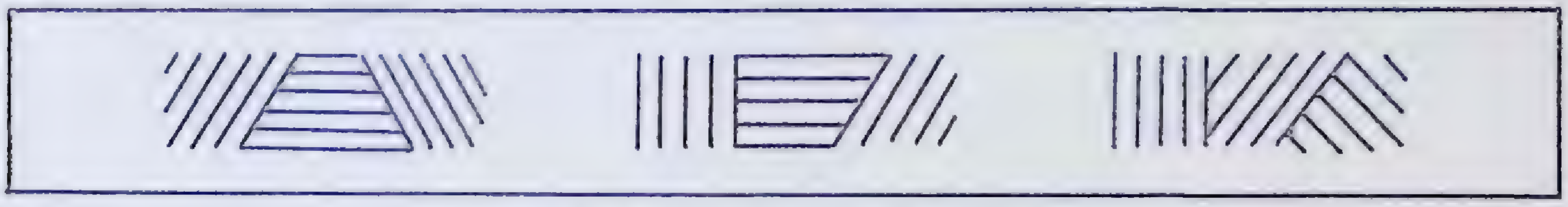
**Sample based on neck fragments only.



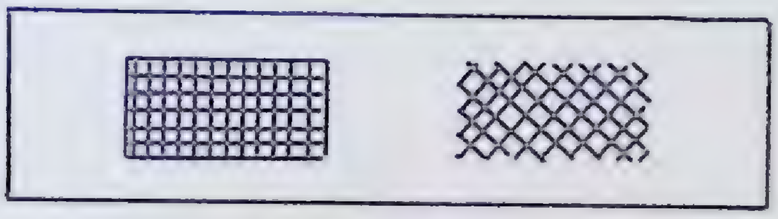
Basic Elements



Simple-Complex Elements



Complex-Complex Elements



Cross-Hatched Elements

FIGURE 10—*Typical design motifs on rim sherd collars*

Because the collar is the most common area for decoration, I shall deal with it first. The principles which underlie Iroquois ceramic decoration will be described, as far as they are manifest at the Payne site.

The production of simple oblique, horizontal, and vertical lines on collars appears to be a starting point of Iroquois ceramic art. At Payne the following distribution is found on rim sherds which have plain necks.

TABLE 13
DESIGNS ON PLAIN NECKED RIM SHERDS

Design	Number	Percentage
Right-to-left oblique lines	60	35
Left-to-right oblique lines	19	11
Horizontal lines	8	5
Vertical lines	4	2
Others	81	47
TOTALS	172	100

Thus it appears that a little more than half of the rim sherds having plain necks are decorated by the addition of the simplest of incised lines, of which the oblique ones are by far the most popular. Once this has been done, additional motifs, which are by no means complex, are accounted for by combinations of favoured designs described as 'simple.' These involve the simple-complex category (which combines two of the basic elements, e.g., vertical and oblique lines), complex-complex (which combines three elements), and cross-hatching.

The popularity of these on rim sherds with plain necks is as follows:

TABLE 14

FREQUENCY OF DESIGNS ON PLAIN NECKED RIMS

	Number	Percentage
Complex-complex	40	50
Simple-complex	36	45
Cross-hatched	5	5
TOTALS	81	100

Thus far I have considered only those rim sherds associated with plain necks. Turning to rim sherds which have added decoration to the neck, certainly an additional step toward complexity of design, the distribution of the design elements used on the collar remains essentially the same. This distribution is indicated below.

TABLE 15

DESIGNS ON DECORATED NECK RIM SHERDS

	Number	Percentage
Right-to-left oblique lines	26	31
Left-to-right oblique lines	11	13
Horizontal lines	12	14
Vertical lines	9	11
Complex-complex	0	0
Simple-complex	21	25
Cross-hatched	4	5
TOTALS	83	99

In summary, there is a balanced striving toward simplicity and complexity of design at Payne. This is manifest in the design distribution on the rim sherds with plain necks. Once the step has been taken to add complexity to the vessel by putting on neck decoration, it seems that the potter is satisfied to use a somewhat less complex collar design. In general, however, there is a tendency to use the simple designs about sixty per cent of the time and the more complex designs some forty per cent.

An additional approach to the study of design complexity is to consider the decorated neck sherds in terms of design combinations—what type of collar decoration is associated with what neck decoration, and to what degree? These data are recorded in Figure 11. Here one finds that the horizontal line neck decoration is predominant and occurs associated with all variations of collar design. The complex neck design is second in popularity and also occurs with all collar variants except the cross-hatch. Last, oblique lines occur in about equal amounts. Vertical lines do not occur in neck decoration. This may well be a function of the form of the vessel neck which would be much more amenable to other designs. Further, the right-to-left oblique neck decoration is rather limited in its distribution, and cross-hatched collar decoration only occurs in association with horizontal line neck decoration. There may be artistic principles at work here, but in terms of this sample they remain obscure.

Up to this point, I have described Payne pottery as if it were a simple product of an incised decorative technique. This is not true. There are a considerable number of rim and shoulder sherds which have undergone what may be termed 'secondary design modifications.' These, of course, add to the all-over complexity of the design produced. The distribution of these second-

		COLLAR						
		▨	▤	▥	▧	▩	COMPLEX	
NECK	▨	5	2				5	12
	▤	13	5	1	4	4	8	35
	▧	3	3	4	2		2	14
	COMPLEX	5	2	5	5		5	22
		26	12	10	11	4	20	83

FIGURE 11—*Design combinations on decorated neck rim sherds*

ary design modifications as they occur to modify collar decoration is presented below.

TABLE 16
DISTRIBUTION OF SECONDARY DESIGN MODIFICATIONS

Design	Plain Necked Rimsherds		Decorated Neck Rimsherds		Total	%
	No.	%	No.	%		
Circular punctates...	35	35	20	62	55	40
Incised notches......	28	27	0	0	28	21
Crossing lines.......	14	13	4	13	18	13
Underlining.........	8	8	8	25	16	12
Lip notching........	12	12	0	0	12	9
Basal notching......	2	2	0	0	2	2
Punctate outlining...	2	2	0	0	2	2
Roebuck punctates...	1	1	0	0	1	1
Blank triangles.......	1	1	0	0	1	1
TOTALS.....	103	101	32	100	135	101

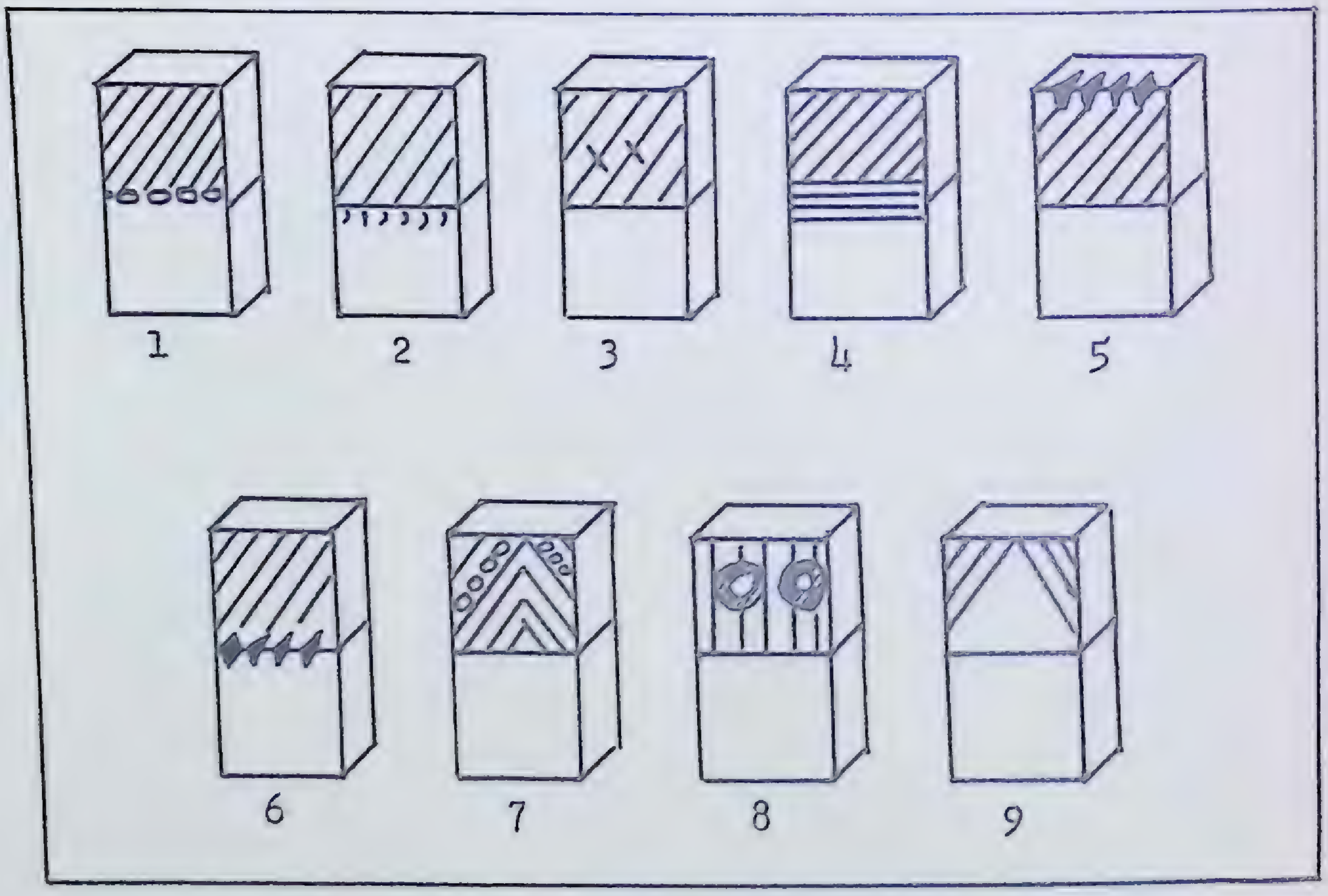


FIGURE 12—*Typical secondary design modifications of rim sherd collars*

1. Circular Punctates
2. Incised Notches
3. Crossing Lines
4. Underlining
5. Lip Notching
6. Basal Notching
7. Punctate Outlining
8. Roebuck Punctate
9. Blank Triangles

Of all the rims studied, 52.9 per cent have secondary modifications. Of these, 40.4 per cent are rims which have plain undecorated necks, and 12.5 per cent are rims with neck decoration. Plain necked rims are thus more often modified than those which already have neck decoration. Of the rims with plain necks, 59.7 per cent are modified, as opposed to only 38.4 per cent of those which have decorated necks. It would thus appear that such secondary modification does serve as a technique for increasing design complexity.

The addition of circular punctations is the most common method of modification and occurs in 40 per cent of the cases. Such punctations are added to the top or bottom of the collar, or to both. Most of the punctations are circular, but they may be triangular, leaf, or wedge shaped. I have not considered it necessary to break these punctations down into distinctive categories for analysis. It appears that the decoration is added by punching the wet clay with a blunted, round-tipped awl.

The second most popular modification technique is to add incised notches by cutting short oblique or vertical lines at the base of the collar with a rather sharp, thin tool. This technique occurs on 21 per cent of the total and is found only on rim sherds with plain necks.

The third most common technique is the production of 'crossing lines.' These appear on 13 per cent of the sherds and occur with equal frequency on rims with or without neck decoration. Such motifs are produced by the addition of short oblique or horizontal lines which are superimposed on, or 'cross,' the basic incised decoration. Such embellishment is usually added to the collar, but it is occasionally added also to the neck. In a few instances I have included a continuous, rather than a short, horizontal line as part of the crossing line category.

The fourth technique is 'underlining.' This tends to be a rather frequent modification of rim sherds with decorated necks. Underlining is produced by the addition of one, two, and sometimes three closely spaced horizontal lines at the base of the collar. These are sometimes associated with similar lines at the top. In some cases there is a series of short vertical lines contained within a horizontal pair.

The only other secondary design modification to achieve popularity (9%) is lip notching. This is restricted in use to plain uncollared rim sherds and appears to be a distinctive decorative technique on its own merit. It has never been common on Ontario Iroquois sites and may well be a mark of trade sherds. The motif is much more usual on Seneca sites in western New York State (11, p. 43). The artistic result is a distinctive one and is made by cutting fairly large V-shaped wedges on the outside of the uncollared, expanded lip.

The remaining four types of secondary modification are rare at the Payne site. Each makes up 2 per cent or less of the total sample. 'Basal collar notching' appears on only a few rims. The notches are cut with a sharp-edged tool on vessels where there is a well-demarcated collar base. This is an established design technique of the eastern Iroquois in Ontario, especially at the Roebuck site (21, p. 139). Its sparsity at Payne would emphasize an apparent lack of an eastern orientation.

The use of what I have called 'Roebuck punctates' does suggest some eastern connection, however slight; these may actually be trade sherds. The Roebuck punctate is a rather distinctive one; it involves an impressed circle with a central round section left flush with the surrounding clay. It would appear that the impression was made with a hollow tube-like instrument. Such punctations occur separately, but sometimes they are combined in groups of three suggesting the eyes and mouth of a stylized face. This element, as suggested, is typically eastern Iroquois.

Punctate outlining and the production of blank triangles occur in the western Neutral area, particularly at the Pound village site (11, p. 15). Punctate outlining is found on only a few sherds at Payne where the design is simply emphasized by rows of circular punctates which parallel the incised line motifs. Blank triangles occur on only one sherd at Payne, but they are quite numerous in western Ontario. The essence of this motif is to add to the symmetry of the incised decoration by leaving other adjacent areas plain and undecorated—hence emphasizing the motif. Such areas are usually triangular.

In general, Payne graphic art is simple and uncomplicated in a straightforward geometric manner. There is, however, an ever-present striving for greater complexity of design by the addition of neck decoration and the broad use of various secondary design modifications. It appears that this art represents the production of complexity by the gradual combination and accretion of simple basic elements.

Additional light on Payne art derives from a study of the shoulder sherds. One hundred and fifty-three shoulder fragments were recovered from the site. All but thirteen of these were decorated. Thus 91.4 per cent of the shoulders are embellished. Almost half, 46 per cent, are decorated by the addition of a simple continuous series of circular punctate elements (Figure 13, A).

Very similar to this addition of circular punctates is the inclusion of a horizontal row of oblique, incised gashes. This comprises 10 per cent of the sample; in one instance the shoulder has a double row of horizontal gashes (Figure 13, B, C).

TABLE 17
SHOULDER DESIGN-FORM ATTRIBUTES

Shoulder Design Motif	All Shoulders		Rounded Shoulders		Carinated Shoulders	
	No.	%	No.	%	No.	%
A	64	46	59	70	5	9
B	14	10	1	1	13	24
C	2	1	2	2		
D	5	3	5	6		
E	13	9	4	5	9	17
F	1	1	1	1		
G	7	5			7	13
H	8	5	3	3	5	9
I	2	2	2	2		
J	14	10	5	6	9	17
K	1	1	1	1		
L	5	3	1	1	4	7
M	1	1			1	1
N	2	2			2	3
O	1	1	1	1		
TOTALS	140	100	85	99	55	100
Plain	13		2		11	
TOTALS	153		87		66	

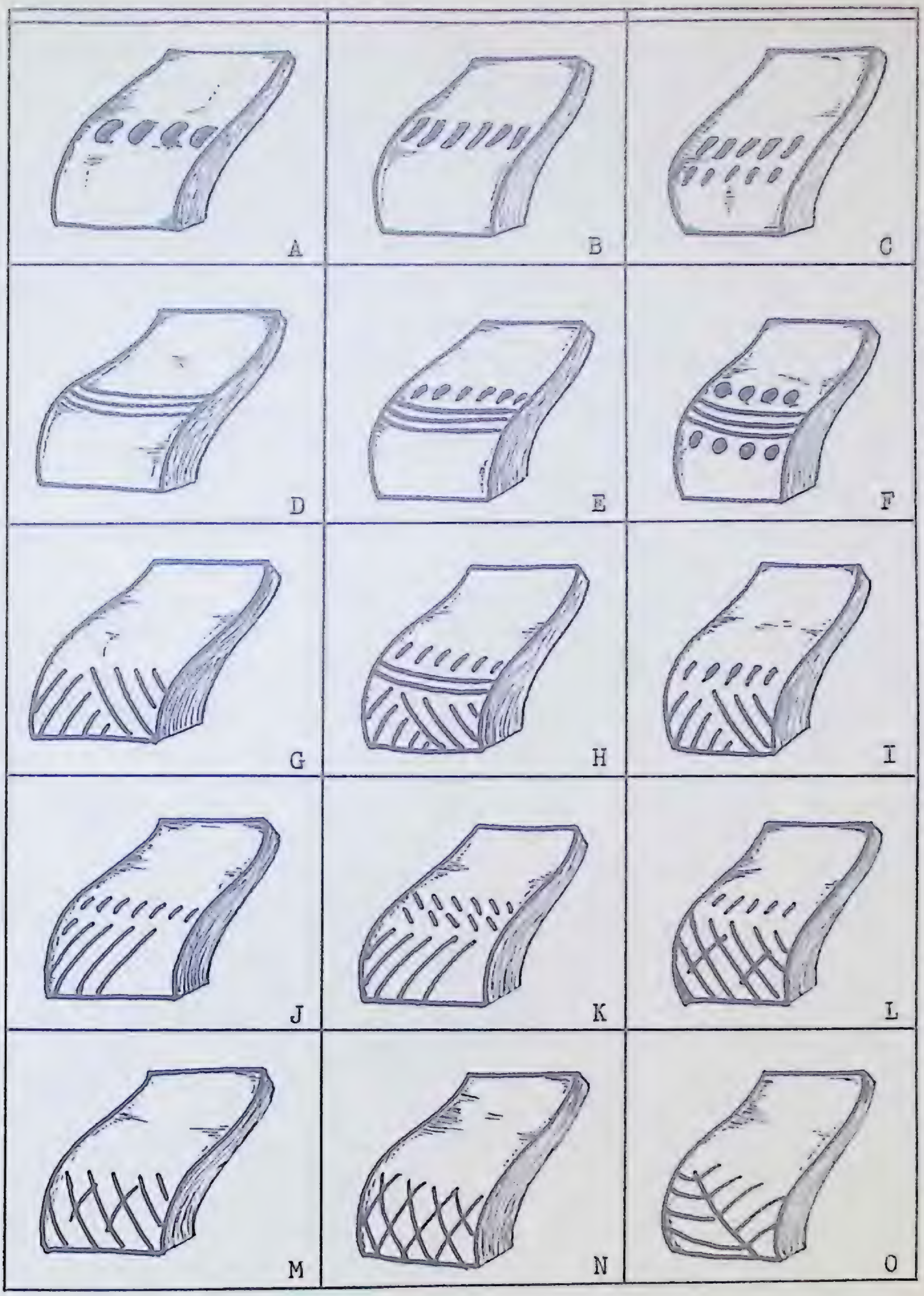


FIGURE 13—*Shoulder design motifs*

A considerable number of the shoulders (13%) are decorated by the addition of three or four encircling horizontal lines. Thirteen of these shoulders have short, oblique lines above horizontal ones. One has punctates above and below. Only five use the horizontal line motif by itself (Figure 13, D, E, F).

Another 12 per cent of the shoulders make use of alternating oblique line motifs. Seven of these shoulders are unmodified, eight have horizontal and oblique lines, and two have oblique and incised elements added above (Figure 13, G, H, I).

The inclusion of triangular plats of oblique lines below the shoulder makes up 11 per cent of the total. All have a row of encircling punctates above the triangular design elements. In one instance, there are two rows of oblique gashes (Figure 13, K).

The final series, making up 6 per cent of the shoulders, involves crossing lines and cross-hatching. The last variation, represented by a single sherd, uses the combination of horizontal and oblique lines as the basic motif (Figure 13, L, M, N, and O).

I have previously noted both the rounded and the carinated shoulder form. Table 17 indicates the distribution of the design elements associated with these two forms. There does not seem to be any spectacular division of form and design here, except that the use of the simple punctate is largely associated with the rounded shoulder form. There is a tendency for the more complex designs, particularly the alternate oblique lines and the triangular plats, to be associated with the carinated shoulder.

In general, this survey of Payne shoulder sherds leads to the conclusion that decoration in this area of the vessel does represent some striving toward the development of a complex decorative motif, but in the main the artist tends to fulfill his artistic obligations through the simple addition of circular punctate elements which do little to add to the all-over complexity of the vessel. There is, however, a minor series associated with the carinated form of shoulder in which quite complex motifs have been achieved, and some of the finest examples of Iroquois ceramic design result.

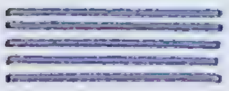
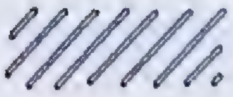
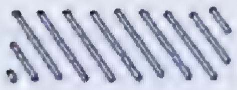
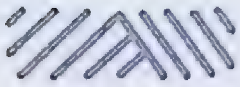
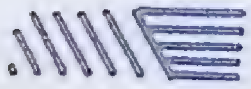
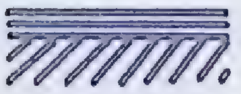
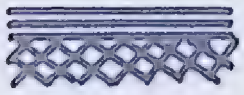
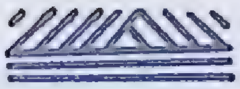
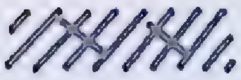
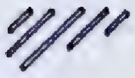
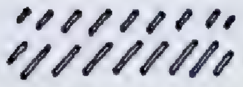
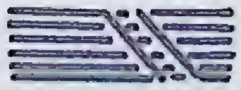
Final insights into the Payne art motifs are based on the study of the decorated neck sherds. Specimens, 678 in number, were studied. On 255 of these the collar portion of the rim remained intact; 423 were neck fragments only. Neck decoration was present on 31.4 per cent of the entire sample. Of necks with the collars intact, 32.4 per cent were decorated at the neck, and 30.7 per cent of the neck fragments were also decorated. In so far as these two groups of neck sherds represent distinctive samples, the amount of decoration is virtually identical. There were, however, some variations in the popularity of the design motifs.

Despite the initial appearance of complexity, it was found that 90 per cent of the designs could be described in terms of quite simple motifs. A series of horizontal encircling lines accounted for 40.8 per cent of them. This is true of both the samples.

Another 25.3 per cent of the necks were decorated by alternate oblique line combinations in which one series sloped from right to left and the other from left to right, abutting against each other. The distribution of these is shown in Table 18.

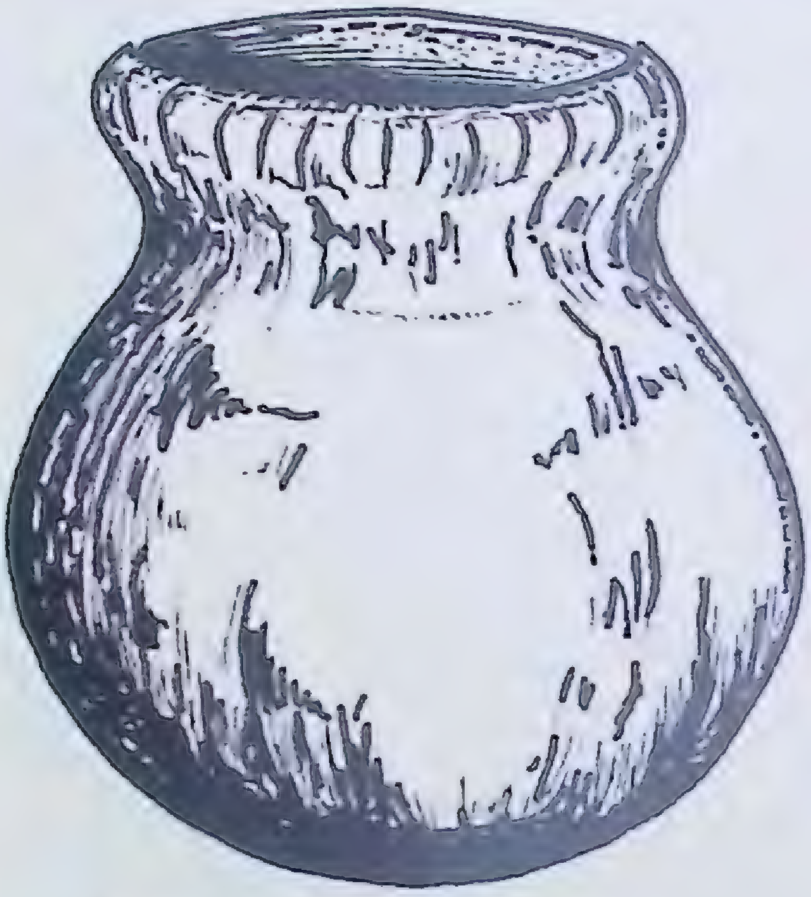
The remaining 10 per cent of the neck sherds are found in eight design categories, none of which is particularly popular. Three of these categories use horizontal parallel lines as a dominant part of the motif. These include first, a series of horizontal lines placed above oblique lines; secondly, a series of

TABLE 18
PERCENTAGE DISTRIBUTION OF NECK DECORATIVE MOTIFS

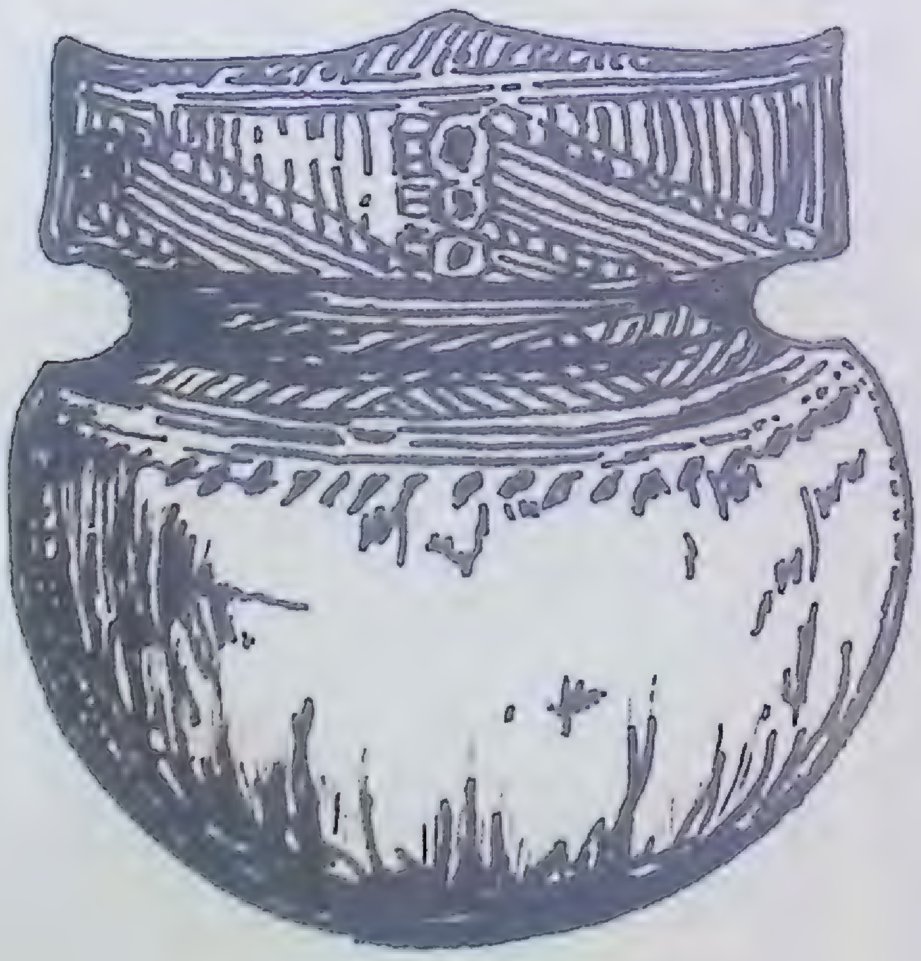
MOTIFS	NECK FRAGMENTS ONLY		NECKS WITH COLLAR PRESENT		ALL NECK SHERDS	
	Number	%	Number	%	Number	%
	53	40.8	34	40.8	87	40.8
	29	22.3	11	13.2	40	18.8
	0		14	16.8	14	6.5
	41	31.5	10	12.0	51	23.9
	0		4	4.8	4	1.8
	0		7	8.4	7	3.2
	0		1	1.2	1	.4
	5	3.8	0		5	2.3
	0		1	1.2	1	.4
	0		1	1.2	1	.4
	1	.7	0		1	.4
	1	.7	0		1	.4
TOTALS	130	99.8	83	99.6	213	99.3

horizontal lines above cross-hatched oblique lines; and thirdly, a series of horizontal lines which occurs below vertical, oblique, and alternate oblique line combinations.

Four additional motifs, of which there is only one example in each category, include oblique elements. In the first instance, right-to-left oblique lines are crossed or overlaid by two small, short, oblique lines in the opposite



from Simplicity.....



.....to Complexity

Figure 14—*Form and design range of Payne vessels*

direction. The second motif comprises a series of right-to-left oblique lines which ceases abruptly, leaving an adjacent undecorated area. The third is a series of two parallel rows of right-to-left oblique lines, leaving a central area where the lines appear to be discontinued. Finally, there is a series of horizontal lines which is interrupted or broken by two oblique lines running from left to right.

The last neck decoration category is represented by four neck sherds. A combination of horizontal and oblique lines is definitive.

I have now examined a particular aspect of Iroquois art as manifest in the design motifs appearing on the Payne site pottery. From a study of broken bits and pieces a definite picture seems to emerge. The art is a complex one, built up by addition and accretion. I have not attempted a serious reconstruction of the fragments, but I have presented in Figure 14 two hypothetical vessels; these represent the extremes of the design-form combinations in both simplicity and complexity.

Finally, analysis of decorative motifs, whatever else it may indicate, points strongly toward one inescapable conclusion: at this site were a people who sought to produce a vessel that was aesthetically and traditionally pleasing to them beyond utilitarian purposes.

(H) Pottery Types at Payne

At this point, one leaves the field of description and turns to the problems of historical construction. Here I follow the lead offered by MacNeish in his study *Iroquois Pottery Types* (11) and apply the analysis method outlined in "Understanding Iroquois Pottery in Ontario" (5). There is little doubt that the problem is complex, but in this very complexity lies hope for historical construction. Previous sections provide a detailed outline and analysis of the form and decorative motif categories encountered at the Payne site and serve to introduce a treatment of these attributes in so far as they are related to each other. Considerations of form and design are essential to the definition of 'pottery types' and to historical construction. MacNeish recognizes pottery types as being identifiable because they involve certain form-design combinations that have a significant and restricted distribution in time and space (11, p. 2). From a comprehensive study of Iroquois pottery, he has defined, with diagnostic features, the pottery types which appear in Ontario and New York State. My task is now to identify and to determine the significance of those types as they appear at the Payne site.

To present the detailed data of my ceramic findings, a series of enclosed master charts depicts the form and design of each of the 256 rim sherds studied. This information is for the specialist and the student of Iroquois ceramics. Because there may be deliberation and debate as to the inclusion of certain rims within one type or another, the data are arranged in such detail that another researcher can rearrange the findings if he so desires. It is possible that, in time, certain pottery types defined today may be subdivided into additional types or may be combined into a single type. If this be the case, then these master charts provide sufficient detail on the individual rim sherds to allow re-analysis and assignment to types as they are added or refined.

Because of its rather technical nature and the amount of detail involved, data on pottery typing are assigned to Appendix A for study. This section discusses the approach to the material. I have followed closely MacNeish's definition of the type in terms of diagnostic features. For example, the type 'Lawson Incised' has as its diagnostic features: "Oblique or vertical parallel incised lines on short, poorly defined, channelled collars" (11, p. 14). A survey of the master chart with this definition in mind allows 56 Payne rim sherds to be assigned to this type.

A summary of the total findings is as follows:

TABLE 19

PERCENTAGE DISTRIBUTION OF POTTERY TYPES OF PAYNE SITE

Pottery Type	Number	Percentage
Lawson Incised	56	21.84
Black Necked	52	20.28
Huron Incised	32	12.48
Pound Necked	31	12.09
Lawson Opposed	30	11.70
Middleport Oblique	13	5.07
Dutch Hollow Notched	12	4.60
Ontario Horizontal	8	3.12
Seed Incised	5	1.95
Durfee Underlined	5	1.95
Warminster Crossed	3	1.17
Lalonde High-Collared	2	.78
Sidey Notched	2	.78
Onondaga Triangular	2	.78
Warminster Horizontal	1	.39
Richmond Incised	1	.39
Iroquois Linear	1	.39
Aberrant	3	1.17
TOTALS	259	100.93

My interest now is to compare this percentage distribution of Payne pottery types with the percentage distributions at other Ontario Iroquois sites. This allows historical construction and follows MacNeish's assumption that "Prehistoric sites with ceramic complexes very similar to or the same as,

TABLE 20
THE PERCENTAGE DISTRIBUTION OF IROQUOIS POTTERY TYPES

	Ontario Horizontal	Ontario Oblique	Iroquois Linear	Uren Noded	Uren Dentate	Uren Corded	Niagara Collared	Lawson Incised	Middleport Criss Cross	Middleport Oblique	Pound Blank	Pound Necked	Lawson Opposed	Black Necked	Sidey Crossed	Seed Corded	Seed Incised	Warminster Horizontal	Huron Incised	Sidey Notched	Warminster Crossed	Lalonde High Collared	Dutch Hollow Notched	Durfee Underlined	Onondaga Triangular	Richmond Incised	Roebuck Low Collared	Swarthout Dentate	Cayuga Horizontal	Cayadutta Incised	Syracuse Incised	Baum Corded	Genoa Frilled	Seneca Barbed	Miscellaneous	Total
Warminster	1	—	—	—	—	—	—	1	—	—	—	—	—	2	—	—	*	13	44	13	22	—	—	—	—	—	—	—	—	—	—	—	2	1	1	100
Orr Lake	1	—	—	—	—	—	—	2	—	—	—	—	2	3	1	—	1	—	45	11	10	—	—	—	—	—	—	—	—	—	—	—	20	1	3	100
Seed	1	—	—	—	—	—	—	6	—	—	—	—	3	4	1	10	26	1	30	5	1	—	2	1	—	1	1	—	1	1	1	2	—	—	2	100
Sidey-Mackay	1	—	—	—	—	—	—	5	—	—	—	—	4	5	3	*	8	*	28	22	8	—	—	2	1	3	1	—	—	4	1	—	—	—	4	100
McKenzie	4	—	—	—	—	—	—	11	—	—	—	—	2	2	1	2	7	1	35	19	—	—	—	1	4	1	—	—	5	3	—	—	—	—	2	100
Black Creek	12	—	—	—	—	—	2	11	—	3	—	3	3	30	—	—	1	5	23	—	—	*	—	1	2	2	1	—	—	—	—	—	—	—	1	100
Parsons	—	—	—	—	—	—	—	31	—	—	1	11	15	8	—	—	—	—	16	—	—	3	1	—	10	—	—	—	—	—	—	—	—	—	4	100
Payne	2	—	—	—	—	—	—	22	—	5	—	12	12	20	—	—	2	1	12	1	1	1	5	2	1	*	*	—	—	—	—	—	—	—	—	100
Bosomworth	1	—	—	—	—	—	—	47	—	—	—	3	4	19	—	—	—	—	11	—	1	12	—	—	—	—	*	*	—	—	—	—	—	—	2	100
Lawson	1	—	—	—	—	—	18	52	—	—	—	11	11	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	4	100
Middleport	35	8	—	—	—	—	2	12	17	15	—	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	100
Pound	24	—	—	—	—	—	—	7	3	16	3	46	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	100
Uren	48	21	15	7	4	2	1	1	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	100

*Indicates that the type is present, but makes up only a small fraction of one per cent.

those of sites of a particular tribe are genetically related to that tribe" (11, p. 5). Comparison will allow some assessment of Payne being Huron, Neutral, or Onondaga in its affinities. In order to pursue this comparison, Table 20 presents the assembled data on the percentage distribution of the pottery types at twelve excavated Ontario Iroquois sites, as well as at the Payne site.

The data in Table 20 provide the basis for a broad comparison in both time and space. The Uren, Middleport, Pound, and Lawson sites of southwestern Ontario represent a prehistoric developmental series in the Neutral area. Warminster, Orr Lake, and Sidey-Mackay, historic sites in Simcoe County, are no doubt Huron. Black Creek, Parsons, Seed, and McKenzie are all prehistoric villages located in the Humber Valley from Toronto to Woodbridge. Bosomworth is a prehistoric site somewhat farther north, near Bradford, at the headwaters of the Nottawasaga River. Thus the Payne ceramics are being compared with samples which represent most of the major time periods and geographical areas involved in the development of Ontario Iroquois.

An initial method of assessing Payne ceramics is to consider to what degree they fit into the 'ceramic trends' which characterize Ontario Iroquois pottery. It is evident that pottery types are invented, become popular, and then are eventually replaced by others. Each exhibits a unimodal distribution. Thus the percentage popularity of the types at a given site is a good clue to temporal and cultural relationships. I have taken the six most popular pottery types at the Payne site and assembled the information on the distribution of these six types at the twelve sites compared with Payne (*see* Table 21).

TABLE 21

PERCENTAGE DISTRIBUTION OF SIX MOST POPULAR PAYNE CERAMIC TYPES

Site	Middleport Oblique	Pound Necked	Lawson Incised	Lawson Opposed	Black Necked	Huron Incised	Percentage
Warminster...	—	—	1	—	2	44	47
Orr Lake.....	—	—	2	2	3	45	52
Sidey-Mackay.	—	—	5	4	5	28	42
Seed.........	—	—	6	3	4	30	43
McKenzie.....	—	—	11	2	2	35	50
Black Creek...	3	3	11	3	30	23	73
Parsons.......	—	11	31	15	8	16	81
Payne........	5	12	22	12	20	12	83
Bosomworth..	—	3	47	4	19	11	84
Lawson.......	—	11	52	11	—	1	75
Pound........	16	46	7	—	—	—	69
Middleport....	15	5	12	—	—	—	32
Uren.........	—	—	1	—	—	—	1

Scrutiny of Table 21 provides a number of pertinent observations. According to the arrangement of the sites upon the chart, certain ceramic trends are evident. Huron Incised is a pottery type that reveals a constant increase in popularity through time. Black Necked, which appears in 'middle' Iroquois times, shows an abrupt decrease in contact and historic times. Both Lawson Incised and Lawson Opposed indicate an early popularity, increasing to a peak in 'middle' Iroquois times and dropping off to a low level of popularity in late prehistoric and historic times. Middleport Oblique and Pound Necked are early types, losing popularity in 'middle' Iroquois times.

Payne fits into these trends as an early-middle period site, and its position is consistent with all the trends noted above.

The percentage figures in the extreme right-hand column of Table 21 are informative. In each case these represent the total type percentage at that particular site for the six pottery types listed as most popular at the Payne site. For example, these six types make up a total of 47 per cent of all the typed sherds at Warminster, whereas they make up 73 per cent of the sherds typed at Black Creek. The six types, of course, constitute 83 per cent of the rims typed at the Payne site. These figures present a nearly consistent unimodal distribution. From 1 per cent at Uren they increase consistently to a peak of over 80 per cent at Bosomworth, Payne, and Parsons and then decrease to between 40 and 50 per cent at the historic period. The middle Iroquois position of the Payne site is again demonstrated.

Turning now to a somewhat more refined type of comparison, applying a modification of the method used by Brainerd (1), I calculated the 'coefficients of similarity' for Payne in relation to all the other sites studied. The coefficient of similarity for two sites is obtained by taking each of the pottery types, determining the difference in their percentage distributions, totalling these differences, and subtracting this difference from two hundred. Thus, if two sites have identical percentage distributions of pottery types there will be no differences, and the index of similarity will be 200. If two sites are completely unlike, the index will be O. In practice, such extreme indices are never obtained. As a guide, however, one recognizes that the higher the index, the closer is the relationship between the two sites. Calculating these indices for the Payne site, the following results were obtained: Parsons 136, Bosomworth 124, Black Creek 118, Lawson 94, McKenzie 72, Sidey-Mackay 68, Seed 68, Pound 54, Middleport 50, Orr Lake 46, Warminster 38, and Uren 8.

These figures suggest the close relationship between Payne and the Parsons, Black Creek, and Bosomworth sites where the ceramic types in each case are over 50 per cent alike. This relationship decreases sharply approaching both early Neutral (Uren, Middleport, and Pound) and historic Huron (Warminster and Orr Lake). This substantiates the observations based on a consideration of the six most popular pottery types found at Payne. Thus the position of this site as middle period Iroquois becomes increasingly clear.

The most convincing assessment of Payne's temporal and cultural position lies in Table 22, the complete coefficient of similarity chart. This chart is drawn up in such a way that those sites listed at the bottom of the chart, e.g., Uren, are early, and those at the top, e.g., Warminster, are late. Or, again, those listed to the left of the chart, e.g., Warminster, are late, and those to the right, e.g., Uren, are early. It is also true that as one proceeds from either the lower left corner or the upper right-hand corner (Uren) toward the upper left-hand corner (Warminster), there is a general geographic shift from sites in southwestern Ontario to sites in the Humber Valley and finally, to sites in Simcoe County, historic Huronia. Thus the chart incorporates and reflects a certain degree of both geographical and temporal reality. It is also important to note that the lower left-hand division of the chart is the mirror image of the upper right portion and that it is divided in half along the oblique axis marked by x's from the upper left to the lower right corner.

This particular chart is also assembled so that as far as possible the indices of similarity increase in value as one moves from either the lower left or the upper right corner towards the central axis in either a horizontal or vertical plane. It is assumed that the order which presents the least number of deviations from such an orderly increase of coefficients is the one which most closely represents historical reality.

The interpretation of the coefficient chart must be made with extreme caution because the coefficient of similarity, which is simply a number in itself, is the end result of a subtle combination of temporal, geographical, and

TABLE 22

COEFFICIENTS OF SIMILARITY BASED UPON POTTERY TYPE ANALYSIS

	WARMINSTER	ORR LAKE	SEED	SIDEY MACKAY	McKENZIE	BLACK CREEK	PARSONS	PAYNE	BOSOMWORTH	LAWSON	MIDDLEPORT	POUND	UREN
WARMINSTER	x	144	82	106	106	65	38	38	42	6	4	4	4
ORR LAKE	144	x	92	104	110	64	46	46	40	14	6	6	4
SEED	82	92	x	122	122	84	60	68	52	26	14	14	4
SIDEY-MACKAY	106	104	122	x	143	85	63	68	54	26	13	12	4
McKENZIE	106	110	122	143	x	96	70	72	54	32	30	22	10
BLACK CREEK	65	64	84	85	96	x	86	118	96	44	62	50	28
PARSONS	38	46	60	63	70	86	x	136	120	108	34	38	2
PAYNE	38	46	68	68	72	118	136	x	124	94	50	54	8
BOSOMWORTH	42	40	52	54	54	96	120	124	x	112	32	22	4
LAWSON	6	14	26	26	32	44	108	94	112	x	40	38	6
MIDDLEPORT	4	6	14	13	30	62	34	50	32	40	x	108	90
POUND	4	6	14	12	22	50	38	54	22	38	108	x	50
UREN	4	4	4	4	10	28	2	8	4	6	90	50	x

TABLE 23

ORDER OF SITE SIMILARITY BASED ON POTTERY COEFFICIENTS

	FIRST DEGREE	SECOND DEGREE	THIRD DEGREE
Warminster	Orr Lake	Sidey-Mackay and McKenzie	
Orr Lake	Warminster	McKenzie	Sidey-Mackay
Seed	Sidey-Mackay and McKenzie		Orr Lake
Sidey-Mackay	McKenzie	Seed	Warminster
McKenzie	Sidey-Mackay	Seed	Orr Lake
Black Creek	Payne	McKenzie	Parsons
Bosomworth	Payne	Parsons	Lawson
Payne	Parsons	Bosomworth	Black Creek
Pound	Middleport	Payne	Uren and Black Creek
Parsons	Payne	Bosomworth	Lawson
Lawson	Bosomworth	Parsons	Payne
Middleport	Pound	Uren	Black Creek
Uren	Middleport	Pound	Black Creek

cultural factors, each and all of which can contribute to raising or lowering the index relating two sites. In assessing the temporal and geographic relationships in greater detail, a study of the degrees of relationship is presented in Table 23. Three columns are used to indicate to what degree the sites are alike ceramically, in order of first, second, and third priority taken from the coefficient chart. This information was used to construct the 'configuration map,' Figure 15.

The configuration map was produced by joining a given site to the one which it most closely approximates ceramically. For example, Bosomworth is most like Payne. The relationship is often reciprocal (e.g., Orr Lake is most like Warminster, and Warminster is most like Orr Lake), but this is not invariably the case (e.g., Payne is not most like Bosomworth). From the 'configuration' certain results are at once evident. There are definite 'site clusters.' Orr Lake and Warminster cluster in Huronia at the historic period. Middleport and Pound cluster in the Neutral area. Parsons and Payne form a cluster unit.

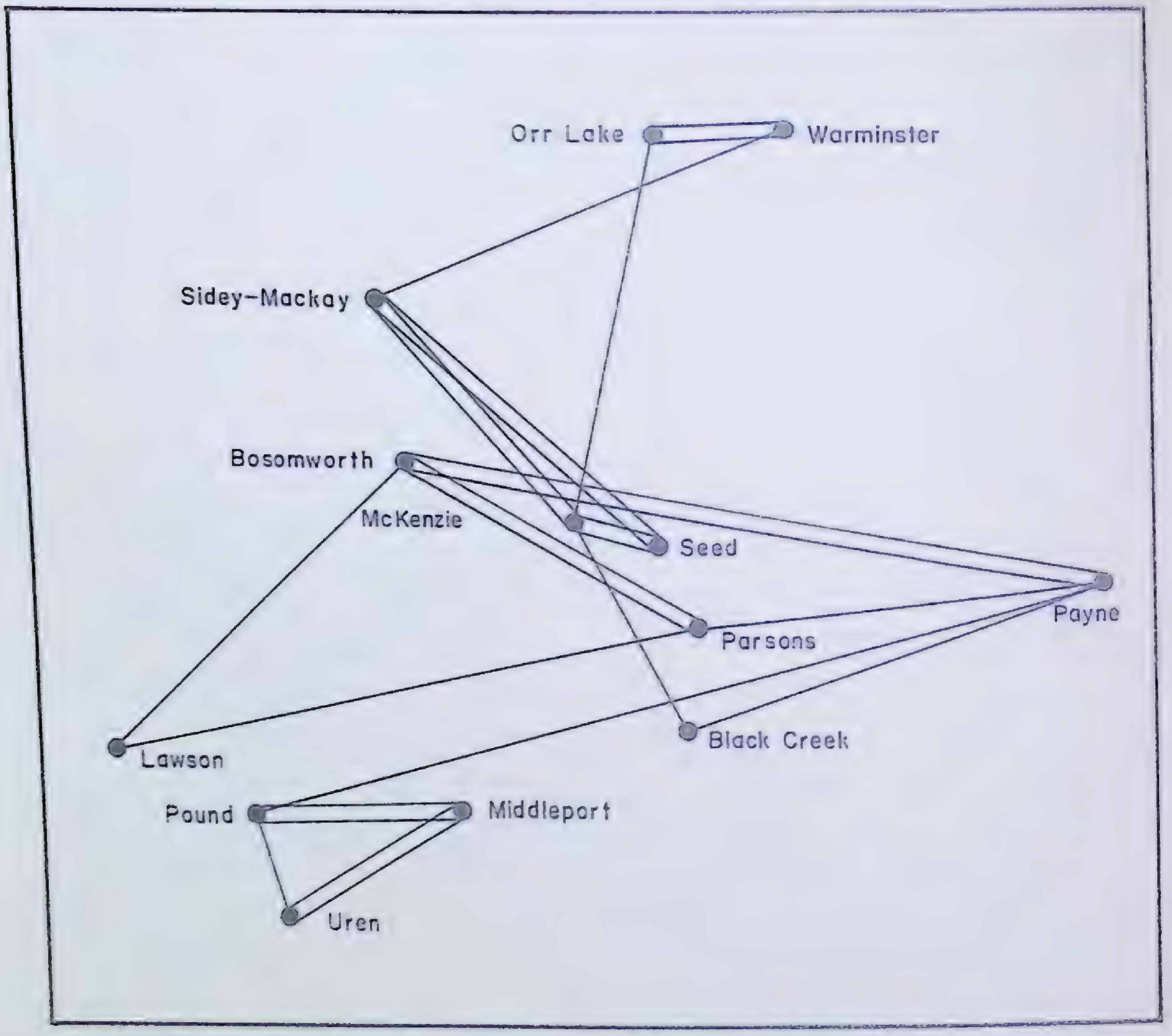


FIGURE 15—*Configuration map based on pottery coefficients*
This configuration map is produced by drawing a solid black line between a site and the ones with which it shares the highest and second highest percentages of similarity.

Certain other observations can be made: first, sites that are geographically close are not necessarily most closely related culturally (i.e., ceramically). For example, Black Creek is more closely related ceramically to the Payne site than it is to the geographically much closer Parsons site. Secondly, the cultural linkage of prehistoric sites with historic sites suggests the direction of migration and cultural development such as from McKenzie to Sidey-Mackay. It would be very tempting to link these 'clusters' into a consistent sequence at this point. But further study of the coefficients in terms of second and third degrees of similarity provide a more realistic basis for doing this. The results of this analysis are presented in the 'relational map,' Figure 16.

This map is a much more dynamic expression of relationships than the configuration map which simply joins static end points, except for the suggested temporal movement connecting McKenzie and Sidey-Mackay. The relational map suggests temporal and spatial movement by the arrows drawn upon it, and it implies cultural development. Assessment may engender some bias and subjectivity, but a considered evaluation is possible in most cases. Take for example the complex of sites involving McKenzie, Seed, Sidey-Mackay, Orr Lake, and Warminster. I have stressed the historical connection and northward movement from McKenzie to Sidey-Mackay. This is emphasized by the fact that McKenzie is more like Sidey-Mackay than it is like the geographically closely adjacent Seed site. In turn, Orr Lake is more closely related to McKenzie than it is to Sidey-Mackay which is

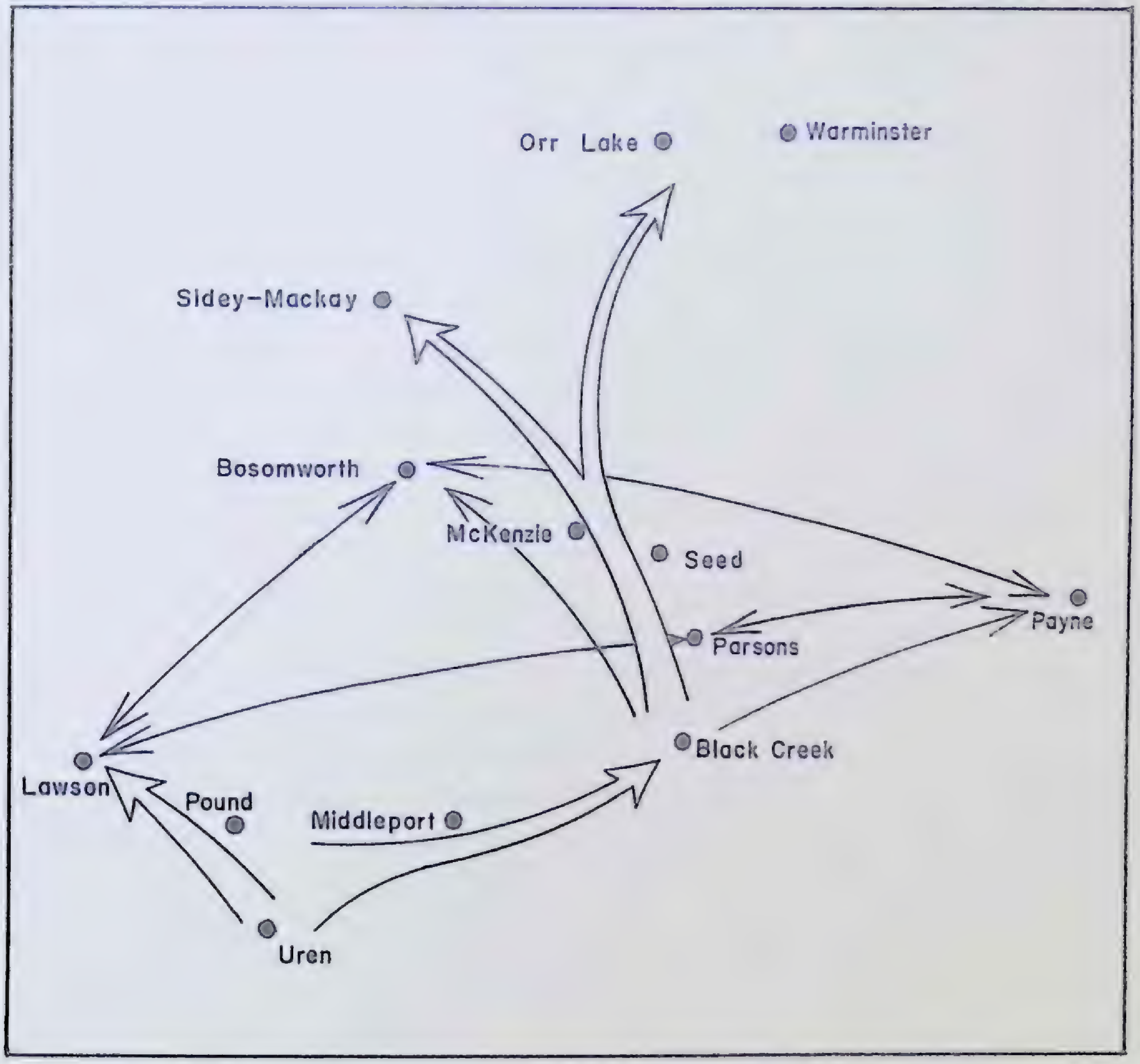


FIGURE 16—*Relational map based on pottery coefficients*

closer in both time and space. Moreover both Sidey-Mackay and Seed are closer to Orr Lake than the latter is to the geographically and temporarily closer Warminster site. To interpret such relationships is a complex problem of analysis. My interpretation is suggested by an arrow which sweeps northward in an arc to Sidey-Mackay; this arrow however bifurcates and swings in a further arc eastward to the Orr Lake and Warminster sites. Translated into historical and cultural terms the explanation for the complex interlinking of these sites is as follows:—During prehistoric times a ceramic tradition flourished and was expressed by the pottery types such as those found at the McKenzie site and, presumably, at other unexcavated sites like it. This tradition continued and slowly changed, but it still showed 71 per cent of its original makeup by the time its influence reached the contact period Sidey-Mackay site. Moreover, certain elements of this tradition were so strong that they were still found to the extent of over 50 per cent similarity at the historic Orr Lake and Warminster sites. This sharing is just as strong as the sharing between these historic sites and the much later Sidey-Mackay site. Thus it would appear that this original ceramic tradition exerted a continuing influence as there was a northward movement of peoples, intimately influencing the contact period sites, and still later the historic sites in Huronia proper.

It would be tedious and would serve little purpose to proceed to explain and defend each and every developmental arrow drawn upon the chart. Each has been drawn with care and consideration. At this point a summary of what I believe the chart demonstrates is in order, for this will be, in essence, a statement of my theory as to the role and place of the Payne site in the story of Ontario Iroquois development in the light of the sites studied.

The development began at the Uren site where ceramic types such as Iroquois Linear, Ontario Oblique, and particularly Ontario Horizontal were found. From this base, Middleport and Pound, and no doubt many unexcavated sites like them, produced a cultural unity which would ultimately lead to the development of historic Neutral. The sharing of such ceramic traits was widely evident, particularly at Black Creek and Lawson. But there was also considerable sharing with Payne. It would appear that at this time the early Iroquois ceramic tradition was widely spread along the north shores of both Lake Erie and Lake Ontario.

At this point it is indicated that the Black Creek site and others like it took up an ancestral cultural role in the metropolitan Toronto area, particularly in the Black Creek and Humber River valleys. Payne was part of this development marked by a first degree relationship to Black Creek, and in turn Black Creek had a third degree relationship to Payne. The main thrust of Black Creek development, however, was northward toward Parsons and McKenzie. I believe that these later villages represent points in a northward migration according to the Iroquois pattern of moving their villages every ten or fifteen years.

As this northern movement took place, there is considerable evidence of a broad intersharing with both the eastern and western villages considered in this study. Lawson, Parsons, and Payne all manifest high degrees of relationship.

Bosomworth is also central in a broad series of sites sharing Neutral and neck-decorated types of pottery. There are linkages between Lawson, Bosomworth, and Payne. Parsons is in part ancestral to Bosomworth. This is marked by the appearance of Lalonde High-Collared pottery at Parsons, 3 per cent, and its increase to 11 per cent at Bosomworth. The successors to Bosomworth are not evident in any of the series of sites studied here. It is my opinion that Bosomworth is one of a series of *small* villages that pushed rapidly northward some time after the period of Black Creek. Parsons and Bosomworth may have been actually contemporary villages. The answer to the later villages, such as Bosomworth, producing Lalonde High Collared pottery may be found at sites in Innisfil township on the south shore of Kempenfeldt Bay (13) and at villages producing Lalonde High-Collared pottery in Huronia proper (15).

Whatever the case, one sees no further evidence of Payne-like manifestations in the Humber Valley after the time of the Parsons site. The McKenzie and Seed sites become prominent, and development gradually shifts northward to the production of contact and historic period Huron.

Thus, in summary, the role of the Payne village in Iroquois prehistory is clear. Payne held an important place as the most easterly known village in a series that stretched all along the north shores of lakes Erie and Ontario and played a role when groups were breaking away from the earlier more-established communities in the Neutral area and setting up villages in the Humber Valley from where they would gradually move northward to become the Huron proper.

There are unsolved problems, however, as regards the Payne site. What happened to the Payne descendants? It is possible that there was a great contraction of peoples and that they became part of the northward-moving populations in the Humber Valley. However, just to the north and the northwest were the lush lands of Huronia, and the Trent Valley offered an access route. It is just as possible that research in the Trent Valley will yield a series of migration villages here comparable to those in the Humber area. In the light of this study, this latter possibility is the more likely. At each point in my analysis I have been impressed by the strong evidence of close interrelationships over broad areas. Lawson, Bosomworth, Parsons, and Payne are related. Middleport, Pound, and Black Creek are related. McKenzie, Seed, Sidey-Mackay, and Orr Lake are closely connected. In the light of this pattern of broad sharing, as manifest by ceramic similarities, it would be surprising to have a great contraction of population take place. I would expect rather to see a continuation of this pattern developed by movements up the Trent, until these two groups of people became welded into the single Huron Nation. The answer to this problem must await the opportunity for archaeological survey and excavation.

One final set of ceramic figures is presented. These separate the pottery types from the sites studied into five main groups (*see* Table 24 and Figure 17). The figures were assembled according to the percentage popularity of Huron ceramic types. Having established the order, the figures for neck-decorated pottery, including Pound Necked and Black Necked, were added. Then the Neutral and Lalonde High-Collared types were added. The final column entitled 'others' includes the trade types and the unanalysable rim sherds.

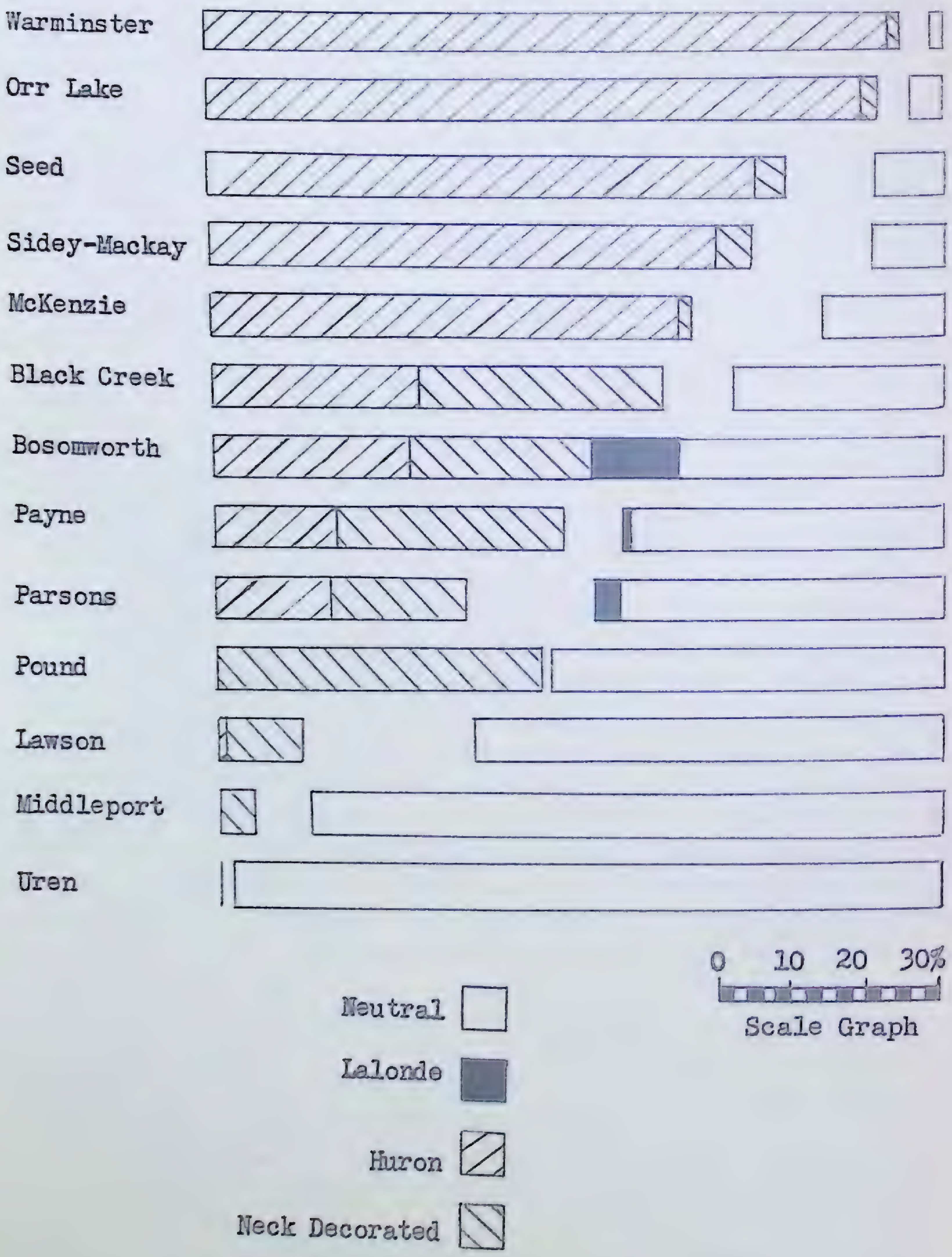


FIGURE 17—*Ceramic group percentage distribution graph*

TABLE 24

PERCENTAGE DISTRIBUTION OF CERAMIC GROUPS

	Huron	Neck Decorated	Total	Neutral	Lalonde	Total	Others
Warminster	92	2	94	2	0	2	4
Orr Lake	88	3	91	5	0	5	4
Seed	74	4	78	10	0	10	12
Sidey-Mackay	69	5	74	10	0	10	16
McKenzie	64	2	66	17	0	17	17
Black Creek	29	33	62	29	0	29	9
Bosomworth	28	25	53	36	11	47	0
PAYNE	17	32	49	42	1	43	8
Parsons	16	19	35	47	3	47	15
Pound	0	46	46	53	0	53	1
Lawson	1	11	12	64	0	64	23
Middleport	0	5	5	87	0	87	8
Uren	0	0	0	98	0	98	2

For purposes of clarity and graphic representation these data are presented in bar-graph form in Figure 17. Certain rather striking trends are evident. The Huron types increase, and the Neutral types decrease in a constant ratio. Two minor trends also appear: Neck-decorated pottery and Lalonde High-Collared pottery both occur fairly early in the series, increase, and then decrease. The former never quite disappears whereas the latter does. The whole graph vividly depicts the manner in which historic Huron developed gradually and slowly by accretion and slow change from a Neutral or proto-Neutral background and the degree to which the Payne site is an integral and central part of the middle stages of this development.

Certain observations should be made on the minor pottery types found at the Payne site, for they offer clues to possible trade relationships and serve as aids in establishing the chronological position of the site. Durfee Underlined and Onondaga Triangular are very popular types at the Roebuck site (11, p. 60) and very minor types here. This suggests that they are trade sherds from eastern New York State rather than from Roebuck. It is likely that Roebuck became an established village in the South Nation watershed at a date shortly after Payne, for there is a considerable increase in these types at the Parsons site (Onondaga Triangular 10 per cent). Dutch Hollow Notched and Richmond Mills Incised relate Payne to western New York. Richmond Mills Incised also cross-dates Payne with Black Creek. Dutch Hollow Notched places it at a time level with Parsons.

In summary, the comparative study of pottery types has provided a useful beginning in the understanding of the Payne site's place in history. This is supplemented below with a consideration of such additional ceramic features as pipes and castellations.

CERAMIC PIPES

One hundred and forty-five fragments of pottery pipes were recovered from the Payne site. These include 69 bowl pieces, 23 mouthpieces, 15 elbow stems, and 38 miscellaneous fragments.

The most striking feature of the pipe fragments is their smallness. They are from one-third to one-half the size of pipes usually recovered on Iroquois sites. A table of comparative measurements presents these data (Table 25). If they had been found as part of a pipe complex elsewhere, they would have been classified as 'miniatures.' The Black Creek and Downsview sites, particularly, produced a considerable number of miniatures (15 per cent). At these sites the miniatures are replicas of the larger pipes. These facts appear to culturally relate Payne, Downsview, and Black Creek. But the general smallness of the Payne pipes must remain a peculiar and unexplained problem.

In order to quantify the 'smallness' of the Payne site pipes, a series of measurements were taken on a small, but I feel convincing, series of Payne and other Iroquoian pipes. Measurements of bowl radius and lip thickness were taken of ten Payne pipes and ten other Iroquois pipes randomly selected, with the following results.

TABLE 25

COMPARATIVE MEASUREMENTS OF PIPE FRAGMENTS

Bowl radius (in $\frac{1}{32}$ inch)		Lip thickness (in $\frac{1}{32}$ inch)	
Payne	Others	Payne	Others*
13.5	24.0	4	5
14.0	21.0	5	6
20.0	34.0	6	7
20.0	37.0	6.5	8
20.5	39.0	7	9
21.0	40.0	7	10
21.5	40.0	7	10
23.0	50.0	8	15
26.0	61.0	9	—
28.5	72.0	9	—
Average radius: 20¼ in.	42¼ in.	Average lip thickness: 6¼ in.	8¼ in.

*Upon two specimens this measurement was not possible.

The immediate observation is that Payne pipes are approximately half the diameter size of other Iroquois pipes and that the lips are of an approximate similar thickness range. Pipes are thus smaller and thicker at Payne than amongst Iroquois counterparts. In order to further emphasize these differences, radius and lip thickness measurements were reduced to a ratio by dividing the latter measurement into the former with the following results:

$\frac{\text{Radius}}{\text{Lip Thickness}}$ Ratio	Payne	Others
1.0 – 1.9	1	—
2.0 – 2.9	4	1
3.0 – 3.9	4	—
4.0 – 4.9	—	4
5.0 – 5.9	1	—
6.0 – 6.9	—	—
7.0 – 7.9	—	1
8.0 – 8.9	—	2
TOTALS	10	8

The clustering of the ratios indicated above clearly emphasizes the differences between the two groups of pipes.

The very smallness of the pipes raises problems as to smoking technique. Certainly a pipeful would scarcely make a lengthy or a satisfactory smoke. My colleague, Dr. James VanStone, has suggested that smoking here may parallel the Eskimo smoking habit, where again a very small pipe bowl is used. The smoking is accomplished by one lengthy, continuous, and all-pervasive 'drag,' which is both soothing and satisfactory from the native smoker's point of view.

The Payne pipes were carefully made, either untempered or finely tempered, and well fired. They are quite hard and are coloured buff, brown, and red. Two techniques were used to manufacture the stem hole. Either a reed or a twisted grass fibre was inserted in the clay and burned out to form the stem hole. On being analysed, eighteen of the twenty mouthpieces indicated that a reed rather than a twisted fibre had been used. Of the miscellaneous fragments studied, fourteen had reed stem holes, and five had twisted fibres ones. The fifteen elbow stem fragments all indicate that the hole was produced by a reed. Thus, 87 per cent of the stems studied indicate reed manufacture and 13 per cent a twisted fibre manufacture.

This distribution is significant, for the reed method constitutes 98 per cent of the cases at the early Iroquois sites of BlackCreek, Downsview, and Parsons. It reduces to 77 per cent at the contact period Benson site. Conversely the use of a twisted fibre increases from 2 per cent at the early sites to 23 per cent at Benson. The Hardrock site has 100 per cent of the stems reed-produced. These data are assembled in Table 26. Table 26 indicates that Payne would fit between the Parsons site and the Benson site in this series. In addition to information on the frequency of stem hole manufacture, Table 26 presents the information on the percentage distribution of stem mouthpiece shape. There are five basic variations, only three of which are found at Payne. Here, twenty stems were observed for variations in form. Eleven tapered either gradually or sharply. One tip expanded and flared at the tip remote from the bowl. The

TABLE 26

PERCENTAGE DISTRIBUTION OF STEM HOLE MANUFACTURING METHOD AND MOUTHPIECE FORM VARIANTS

Site	STEM HOLE MANUFACTURE METHOD			MOUTHPIECE FORM					
	Reed	Twisted Fibre	Number in sample	Tapered	Flared	Bulbous	Nipple	Ground	Number in sample
	%	%		%	%	%	%	%	
Hardrock	100	0	65	36	0	0	9	55	21
Black Creek	98	2	85	70	0	0	3	27	34
Downsview	98	2	82	66	0	0	0	34	37
Parsons	98	2	63	60	5	0	5	30	20
Payne	87	13	54	55	5	0	0	40	20
Benson	77	23	81	48	12	4	0	36	25

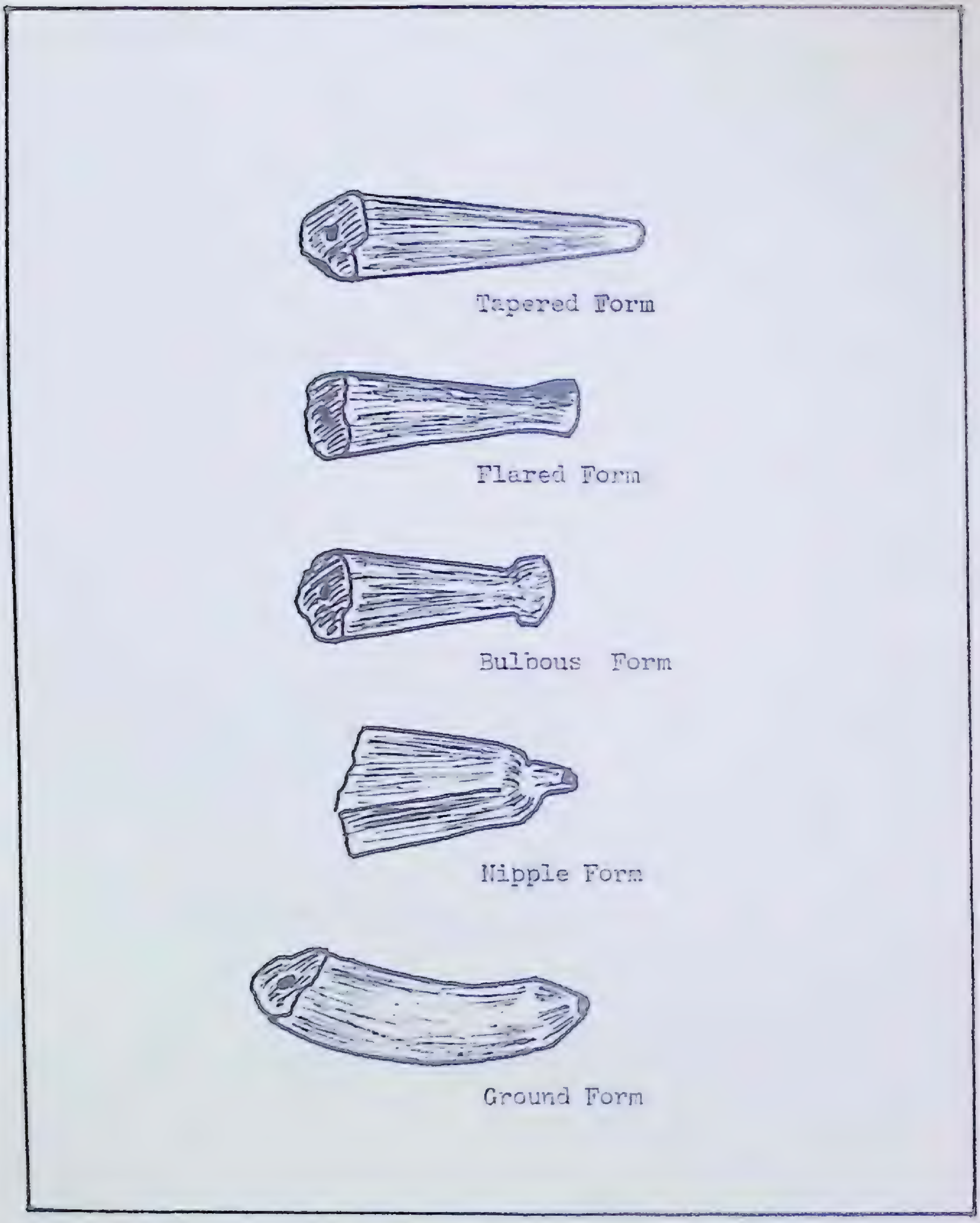


FIGURE 18—*Pipe stem forms*

remaining eight were *ground down* to a sloping tapered point. The bulbous and nipple forms are absent from the Payne site. In terms of the six sites studied it is difficult to formulate consistent patterns regarding form. The Hardrock site, in particular, would appear to fit equally well at either end of the series. However, certain generalizations which allow me to assess the Payne material do hold. From Black Creek to contact times, the tapered tip is consistently dropping in popularity, again placing Payne between Parsons and Benson. The flared form is increasing from Parsons to Benson allowing the placement of Payne near Parsons in time and certainly after Black Creek and Downsview. The flared form becomes very popular at the time of historic Huron (15), thus placing Payne again near Parsons in time.

The most comprehensive comparison is based upon pipe typology. The Payne site is rather unusual in its wide range of pipes. Of its twenty types, ten are restricted to Payne. The following types occurred:

TABLE 27

PAYNE PIPE TYPES, PERCENTAGE FREQUENCY

Type	No.	Percentage
Iroquois Trumpet	17	29.0
Conical Ring	6	10.3
Punctated Bulbous	5	8.6
Conical Plain	4	6.9
Collared Plain	3	5.2
Iroquois Ring	3	5.2
Collared Ring	3	5.2
Ring Trumpet	2	3.5
Elongated Ring	2	3.5
Tapered Trumpet	2	3.5
Conical Decorated	1	1.8
Miniature Trumpet	1	1.8
Plain Bulbous	1	1.8
Decorated Bulbous	1	1.8
Decorated Vasiform	1	1.8
Human Effigy	1	1.8
Corn Cob Effigy	1	1.8
Roebuck Human Effigy	1	1.8
Lizard Effigy	1	1.8
Aberrant	1	1.8
TOTALS	57	98.9

Most common is the Iroquois or Plain Trumpet pipe (29.0%). This is a widespread and popular type at all Iroquois sites studied, except Uren and Middleport. It appears frequently at Roebuck, Lawson, and Sidey-Mackay, and all the sites in my comparative series.[1] The percentage frequency of this type indicates Payne's close relationship to Black Creek.

Second in popularity, 10.3 per cent, is the Conical Ring pipe. This type does not occur at Wintemberg's sites but was quite numerous at all the sites in the comparative series. Its occurrence at Payne is similar to that at Downsview.

The Punctated Bulbous, the third most common type (8.6%), is restricted to Payne. It appears to be a specialty of these people. Punctation is used to decorate a pipe bowl from Downsview, but the bowl form is quite different. Punctated pipe stems occur at the Hardrock and Black Creek sites. It appears that punctate decoration is confined to the earlier sites in the series.

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[1] In this study of pipes, I am able to make only a general comparison with Wintemberg's sites, working mostly with his plates and illustrations. It has been almost impossible to reduce his data to mathematical terms for comparison. I will, however, allude to data from Middleport, Lawson, Roebuck, and Sidey-Mackay. In addition to this I have detailed information on the pipe types from the Benson, McKenzie, Downsview, Black Creek, and Bosomworth sites to compare with Payne material.

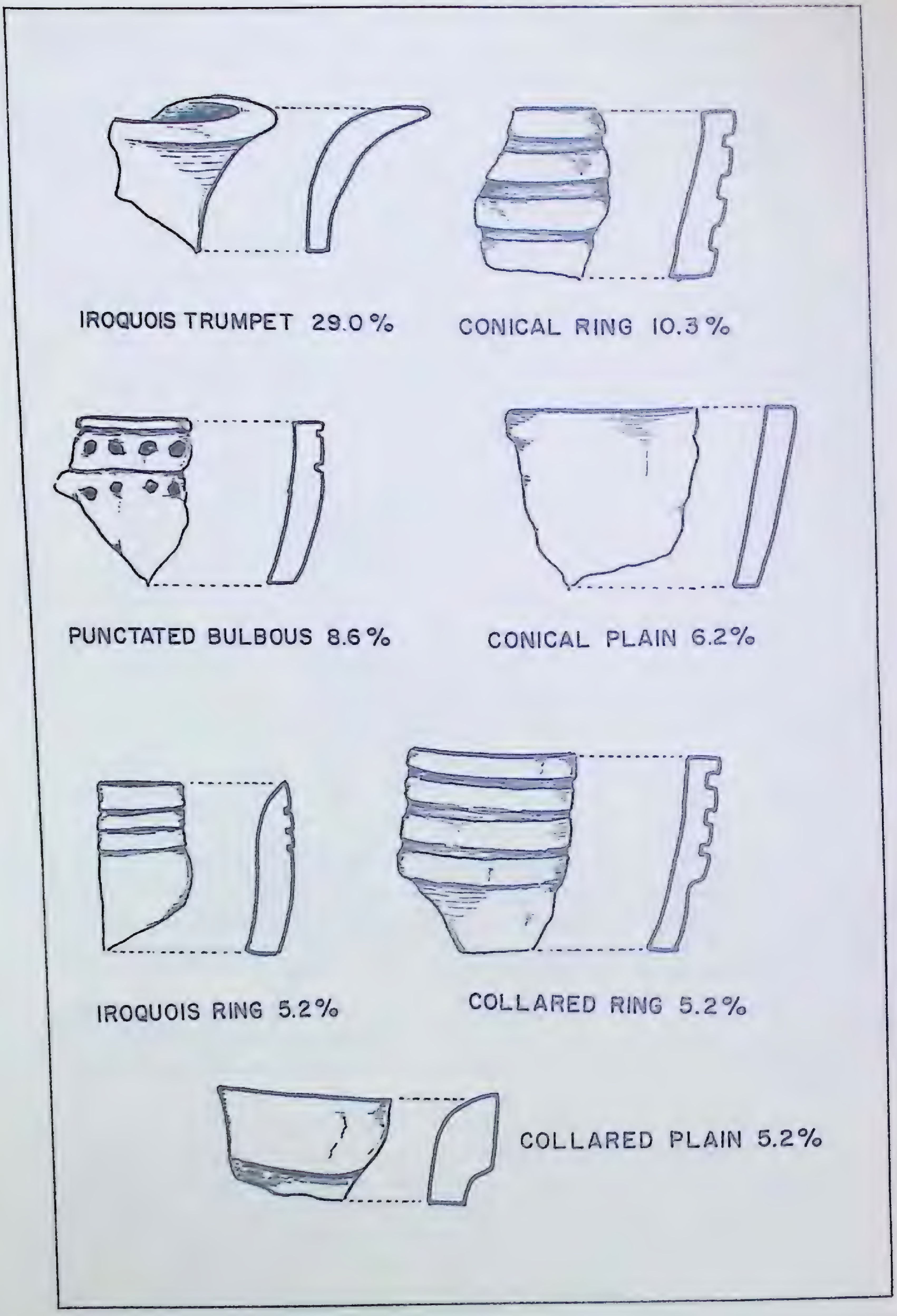


FIGURE 19—*Payne pipes*

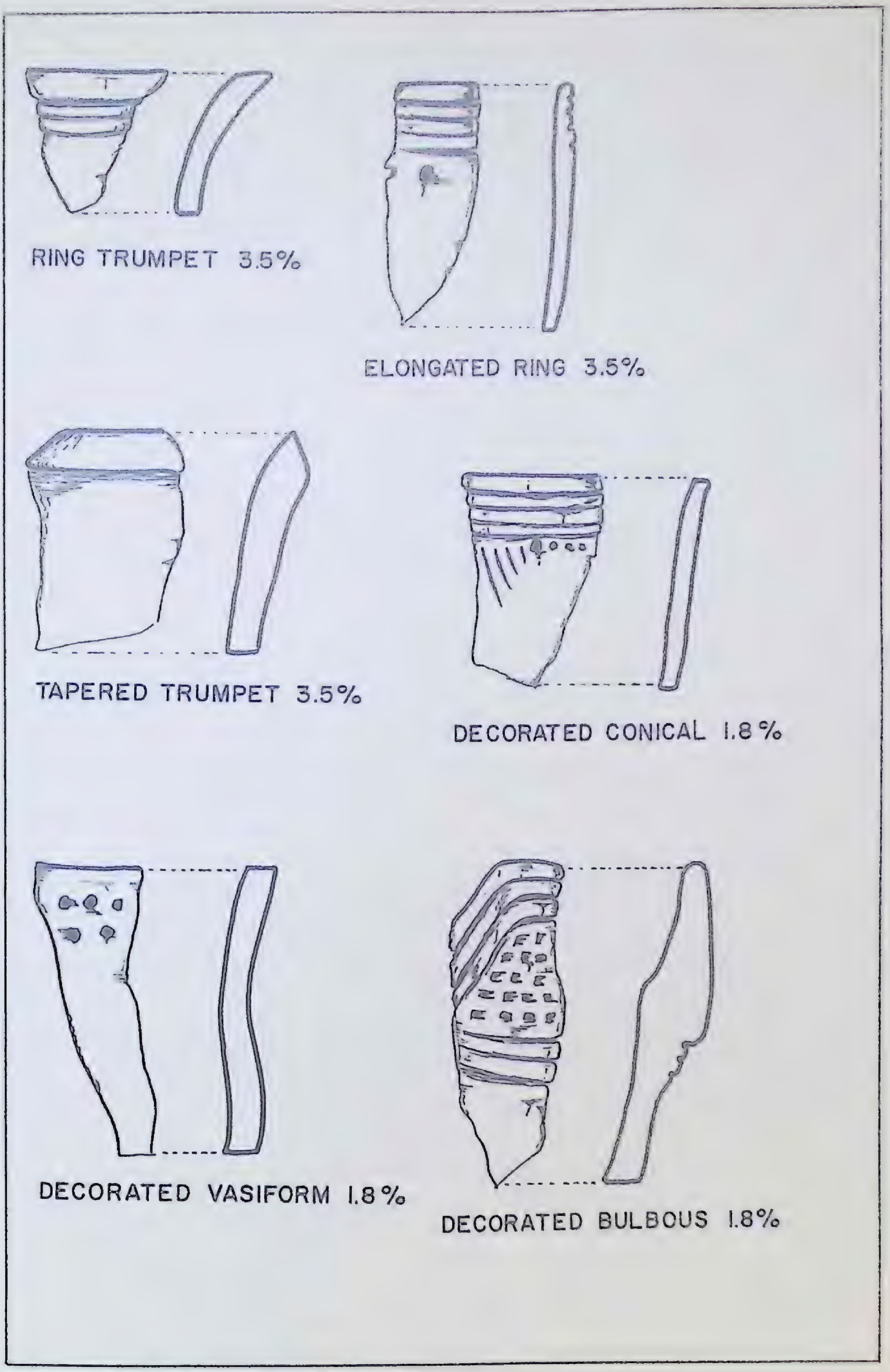


FIGURE 20—*Payne pipes* (Conc.)

The Conical Plain type makes up 6.9 per cent at Payne. It was found only at Lawson and Sidey-Mackay in Wintemberg's reports. It does not occur at any of the sites in the comparative series. Considering the Iroquois interest in decoration, this is not surprising.

Ring pipes and collared pipes form a considerable series of the minor types. The Iroquois Ring pipe (5.2%) and the Elongated Ring pipe (3.5%) at Payne are quite popular at Black Creek and Downsview. These latter sites may be the centre for such development. These are also quite popular at Bosomworth. The Iroquois Ring pipe is found at Lawson and has a meagre occurrence at Middleport and Sidey-Mackay.

Collared pipes are quite popular at Roebuck. However, the Plain Collared pipe (5.2%) is found only at the Payne site. The Collared Ring pipe, also 5.2 per cent, is quite popular at both Roebuck and Lawson. It is absent from all the sites in the comparative series.

Among the minor pipe types, the various trumpet pipes encountered at Payne are also quite popular at Roebuck: the Ring Trumpet (3.5%), the Tapered Trumpet (3.5%), and the Miniature Trumpet (1.8%). Roebuck, Downsview, and Payne are the only sites studied which produce the Ring Trumpet pipe. The Tapered Trumpet pipe (3.5%) is quite popular at the Hardrock site on Balsam Lake. Miniatures are restricted to Payne, Black Creek, and Downsview.

The production of effigy pipe forms makes up 6.8 per cent of the pipes at Payne. Two human effigy pipes were found; one is small and depicts a human face. However the definition is so indefinite that it could be an owl effigy. The second is the nose portion of a Roebuck human effigy type. A fragment of a bowl was found featuring a modelled arm such as is found upon the lizard effigy type of pipe. The bowl itself represents a carrying basket. In the effigy series I am also including a pipe with a noded stem and bowl that appears to suggest a corn cob.

Two Bulbous pipes were found, one plain and one decorated. The plain pipe is unique to Payne. The decorated type is popular upon historic sites. One Decorated Vasiform pipe was found such as is present at Black Creek. One Conical Decorated pipe occurred; pipes of this type are also found at Middleport, Roebuck, and Sidey-Mackay.

For comparative purposes I have assembled in Table 28 the percentage distribution of pipe types at the Benson, McKenzie, Downsview, Black Creek, and Bosomworth sites. The coefficients of similarity based upon these figures are presented in Table 29. Table 28 clearly demonstrates two main points; first, the Payne people specialized considerably in that ten of the twenty pipe types found at the site are restricted to them; and secondly, Payne is a 'middle period' Iroquois village, for it is here that there is the greatest sharing and overlapping of sites, particularly with Black Creek, Downsview, and Bosomworth. The site does not produce any of the late prehistoric and historic pipes such as the mortice, coronet, and specific human, bird, and animal effigies.

These relationships are even more graphically observed in the coefficient of similarity chart, Table 29. It will be seen that Payne is peripheral to the developments taking place. Its highest degree of sharing is with Black Creek

TABLE 28

COMPARATIVE PERCENTAGE DISTRIBUTION OF CERAMIC PIPES

Type	Bosomworth	Payne	Black Creek	Downsview	McKenzie	Benson
	%	%	%	%	%	%
Lizard Effigy.	—	1.0	—	—	—	—
Corn Cob Effigy. . . .	—	1.8	—	—	—	—
Plain Bulbous.	—	1.8	—	—	—	—
Decorated Bulbous. .	—	1.8	—	—	—	—
Conical Decorated. .	—	1.8	—	—	—	—
Aberrant.	—	1.8	—	—	—	—
Tapered Trumpet. . .	—	3.5	—	—	—	—
Collared Plain.	—	5.2	—	—	—	—
Conical Plain.	—	6.9	—	—	—	—
Punctated Bulbous, small.	—	8.6	—	—	—	—
Plain Tubular.	7.7	—	—	—	—	—
Punctated.	15.4	—	—	2.0	—	—
Decorated Vasiform.	7.7	1.8	3.2	—	—	—
Ring Trumpet.	7.7	3.5	—	5.5	—	—
Iroquois Ring.	7.7	5.2	12.7	7.3	—	—
Elongated Ring.	23.1	3.5	23.2	25.2	—	—
Conical Ring.	15.4	10.3	5.3	10.9	13.1	14.5
Apple Bowl.	15.4	—	2.2	7.3	10.5	5.0
Collared Ring.	—	5.2	2.2	3.8	7.9	2.6
Plain Trumpet.	—	29.0	33.8	20.0	21.1	9.7
Miniature Trumpets.	—	1.8	15.9	15.3	2.6	—
Human Effigy.	—	3.5	1.1	2.0	—	7.3
Mortice.	—	—	—	—	15.8	33.3
Coronet.	—	—	—	—	23.7	24.0
Bird Effigy.	—	—	—	—	5.2	—
Snake Effigy.	—	—	—	—	—	2.6
TOTALS.	100.1	98.0	99.6	99.3	99.9	99.0

and Downsview, but even here it has a similarity of only 50 per cent. This is quite small compared to the sharing of Benson and McKenzie, or Black Creek and Downsview, where the sharing is over 70 per cent. Bosomworth is also peripheral.

The coefficient of similarity data was used to produce the configuration in Figure 21 by joining those sites which had a first and second degree of relationship. Again the peripheral nature of Payne is indicated. The closest connections are with Black Creek and Downsview. Again the clustering of Black Creek, Downsview, and Bosomworth is evident. Black Creek is

TABLE 29

COEFFICIENTS OF SIMILARITY FOR CERAMIC PIPES

	BENSON	McKENZIE	DOWNSVIEW	BLACK CREEK	PAYNE	BOSOMWORTH
BENSON		141	63	43	55	40
McKENZIE	141		90	68	79	48
DOWNSVIEW	63	90		155	102	113
BLACK CREEK	43	68	155		102	113
PAYNE	55	79	102	102		50
BOSOMWORTH	40	48	113	84	50	

ancestral in this development. There is a hiatus between Downsview and McKenzie, but the developmental connections from there are towards contact period Huron.

In summary, the pipe analysis confirms and supplements the hypothesis based on findings from pottery types and stone and bone artifact analysis. My final series of observations is based on a study of castellations.

CASTELLATIONS

A typical feature of the Iroquois pottery vessel is the peaked elevation on the rim called a 'castellation.' It is found in a wide variety of forms, and some have the appearance of a pouring spout. However, the range of shapes suggests they probably never served this purpose and that their basic function is decorative. These forms varied considerably in time and space and offer useful clues to the historical position of a site. Their analysis follows my outline in "Castellation Development Among the Iroquois" (4), where the various castellation types are described and named. Figures 22, 23, and 24 show the types from Payne. Thirty-nine analysable castellations were recovered, and the following distribution was found.

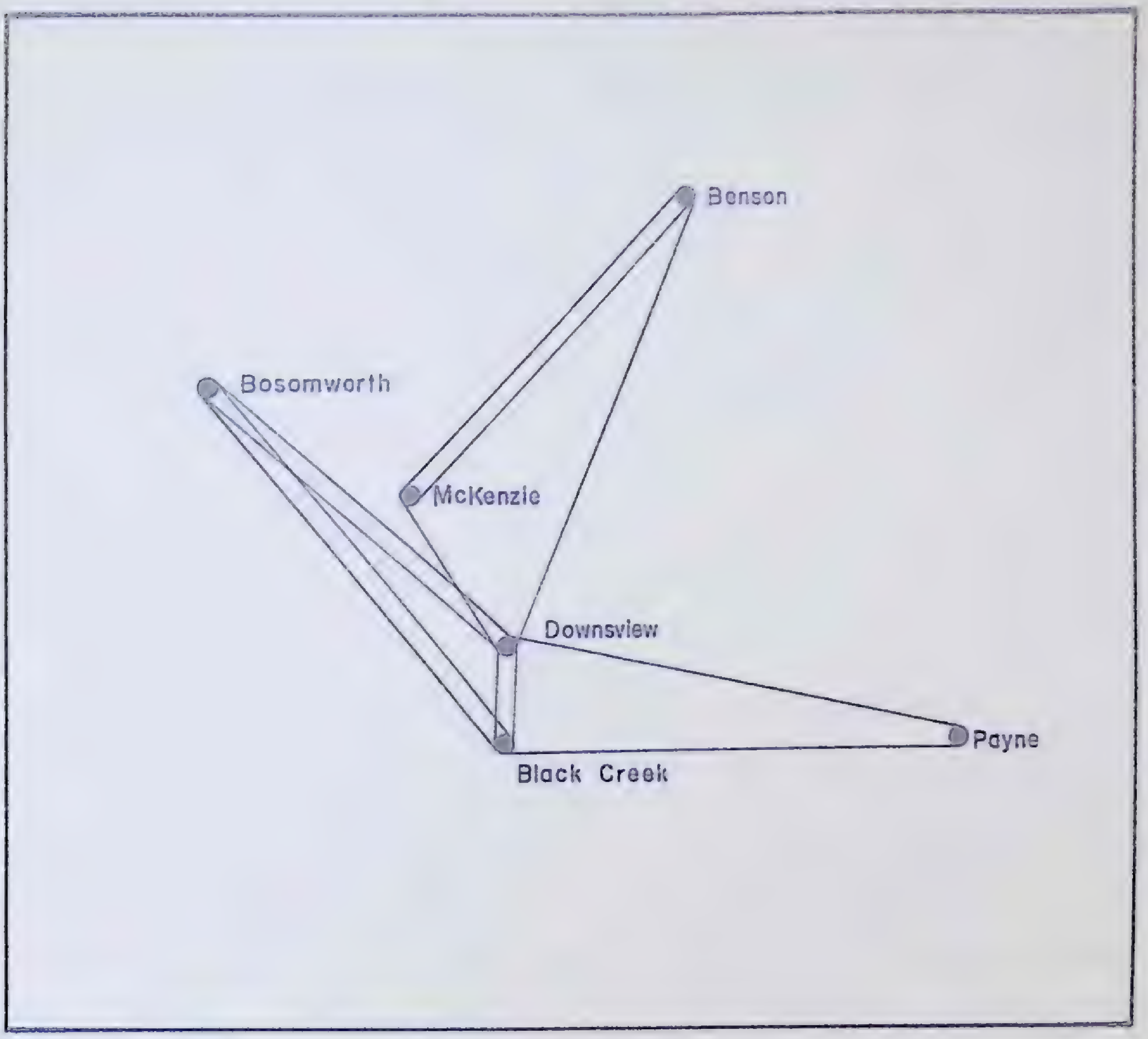


FIGURE 21—*Configuration map based on pipe analysis*
This configuration map is produced by drawing a solid black line between a site and the ones with which it shares the highest and second highest percentages of similarity.

TABLE 30

DISTRIBUTION OF CASTELLATION TYPES AT THE PAYNE SITE

Type	Number	Percentage
Classic Pointed	19	49.9
Decorated Neck	9	23.6
Punctate Face	4	7.8
Circular Punctate	2	5.2
Incipient Pointed	2	5.2
Multiple	1	2.6
Broad Turret	1	2.6
High Collared Pointed	1	2.6
TOTALS	39	99.5

In analysing the Payne castellations I first compared their distribution with the types found at Wintemberg's sites. Since it is not possible to obtain percentage distribution figures from Wintemberg's reports, I have dealt with the data on a presence or absence basis (*see* Table 31).

TABLE 31

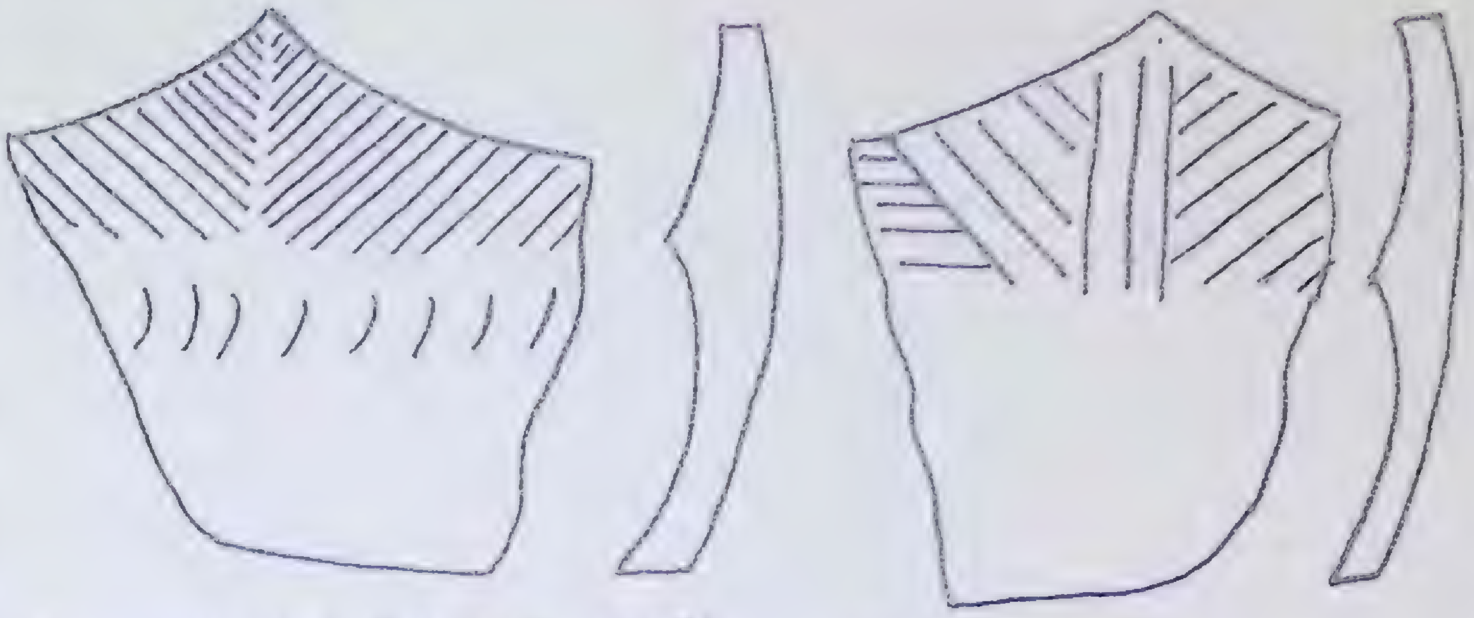
CASTELLATION TYPES AT WINTEMBERG'S SITES

Type	Uren	Middleport	Lawson	Payne	Roebuck	Sidey-Mackay
Turret	—	—	—	—	x	x
Grooved and Notched	—	—	—	—	x	x
Broad Multiple	—	—	—	—	x	x
Circular Punctate	—	—	—	x	x	x
Face Punctate	—	—	—	x	x	—
Incipient Turret	—	—	x	—	—	—
Multiple	—	x	—	x	x	—
Decorated Neck	—	x	x	x	x	x
Classic Pointed	x	x	x	x	x	—
High Collared Pointed	—	x	—	x	—	—
High Collared Nubbin	—	x	x	—	—	—
Rolled Rim	x	x	x	—	—	—

The chart indicates that a given site will produce between two and eight castellation types with five types being most usual. Certain types, such as the High Collared Nubbin, are confined to the early sites, whereas the Turret type is restricted to the later period. The Classic Pointed and Decorated Neck types are widely popular in time and space. In so far as Table 31 is organized so that the lower left portion of the chart is early Iroquois and the upper right portion is late contact period Huron, it is evident that Payne occupies a central position in the series.

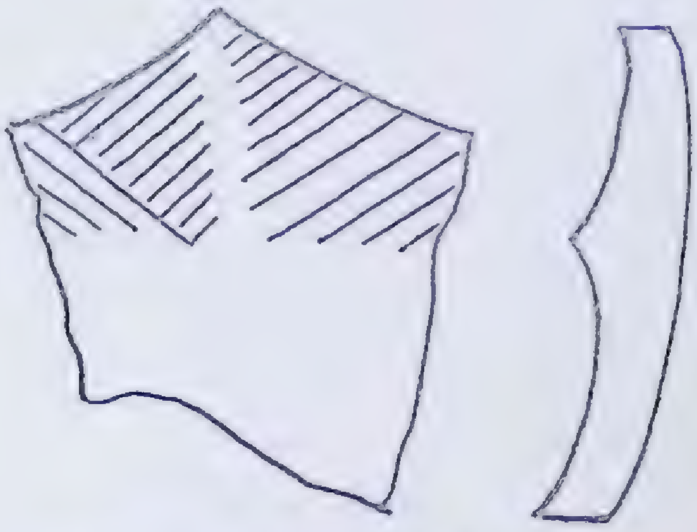
The result obtained by this comparison with Wintemberg's sites is further supplemented by a study of the percentage distribution of castellation types at a series of eight Iroquois sites. A study of the percentages yields a clearer picture than the study simply of presence or absence (*see* Table 32).

Table 32 is organized so that the upper left section of the chart is early, actually 'middle,' Iroquois, and the lower right portion is late contact Huron. The castellation types are also grouped into 'Early,' 'Middle,' and 'Late' period types. Totals and subtotals are inserted into the framework of the chart at various points. These subtotals are instructive. For example, 98.8 per cent of the Black Creek castellations are of the early type, whereas only 43.4 per cent of the Benson types are early. The 81.3 per cent occurrence of early types at Payne suggests its location in time as being closer to the early part of the series. Nearly 20 per cent (18.2) of the Payne castellations are middle period types, and none are late period. These figures equate the Payne site very closely to Bosomworth in time. Thus the castellation analysis again confirms the early-middle time status of the Payne site.

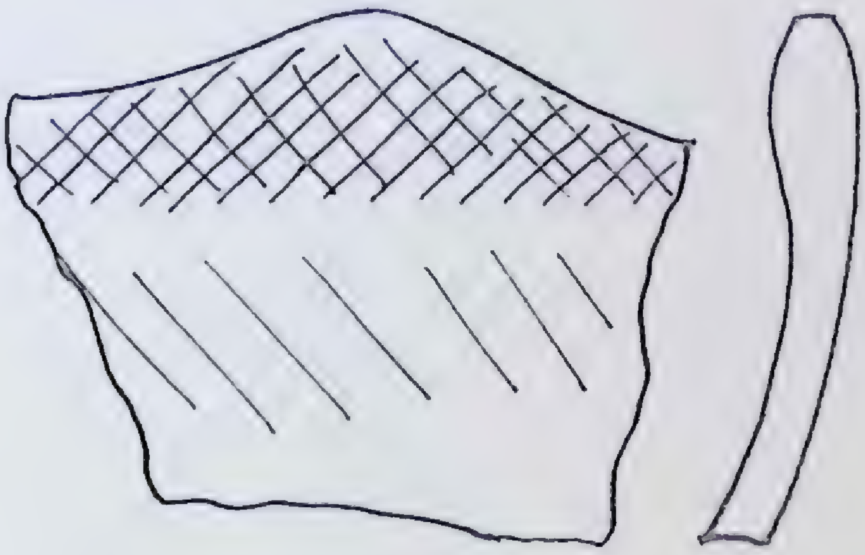


A. Classic Pointed Type 49.9%

B. High Collared
Pointed Type 2.6 %

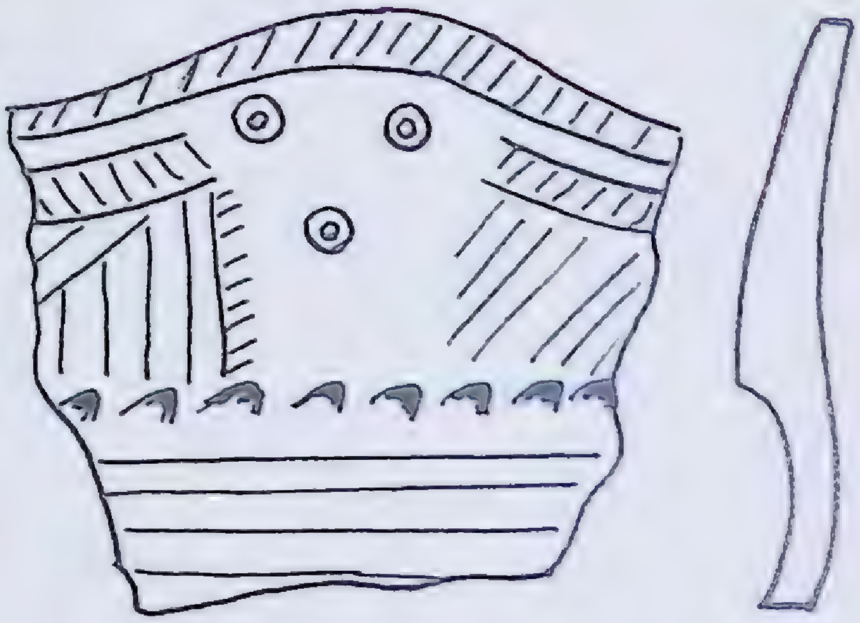


C. Classic Pointed Type

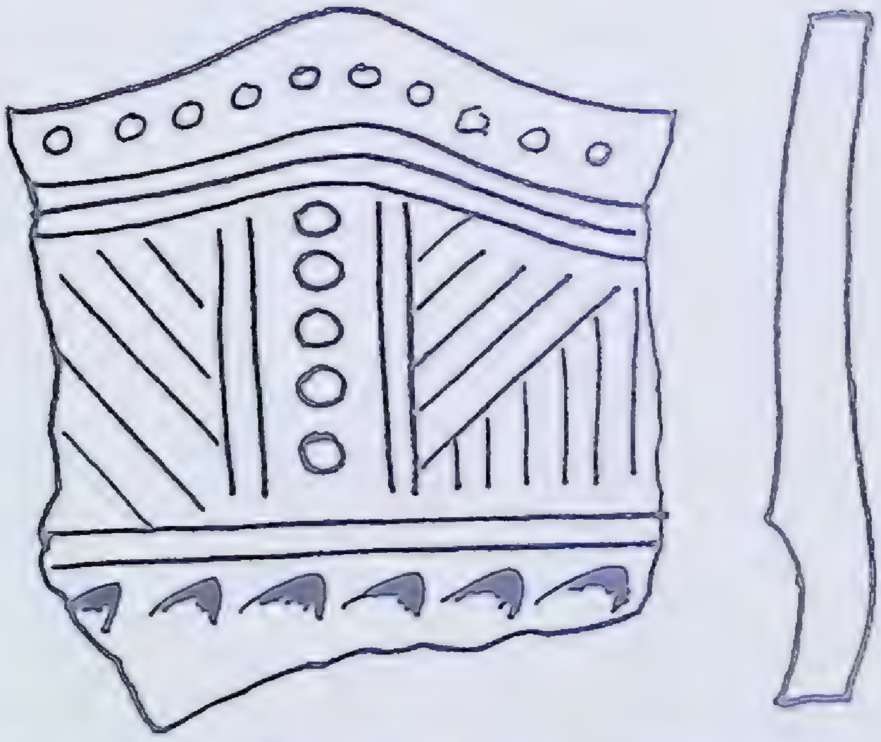


D. Incipient Pointed Type 5.2 %

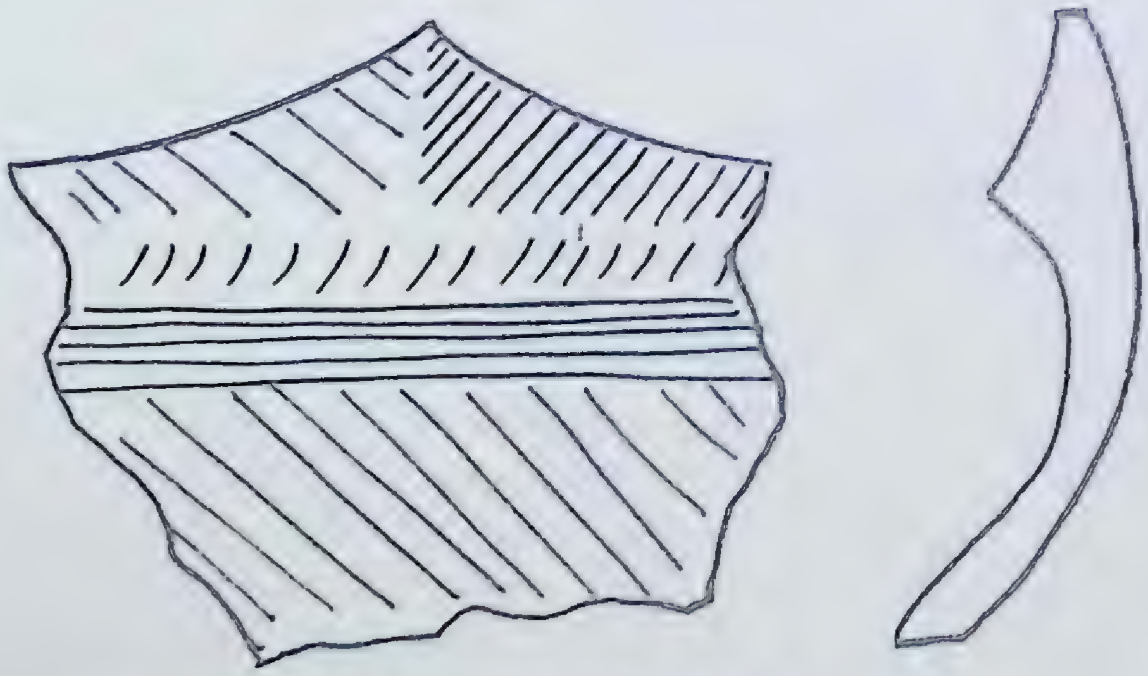
FIGURE 22—*Payne castellations*



A. Face-Punctate Type 7.8%

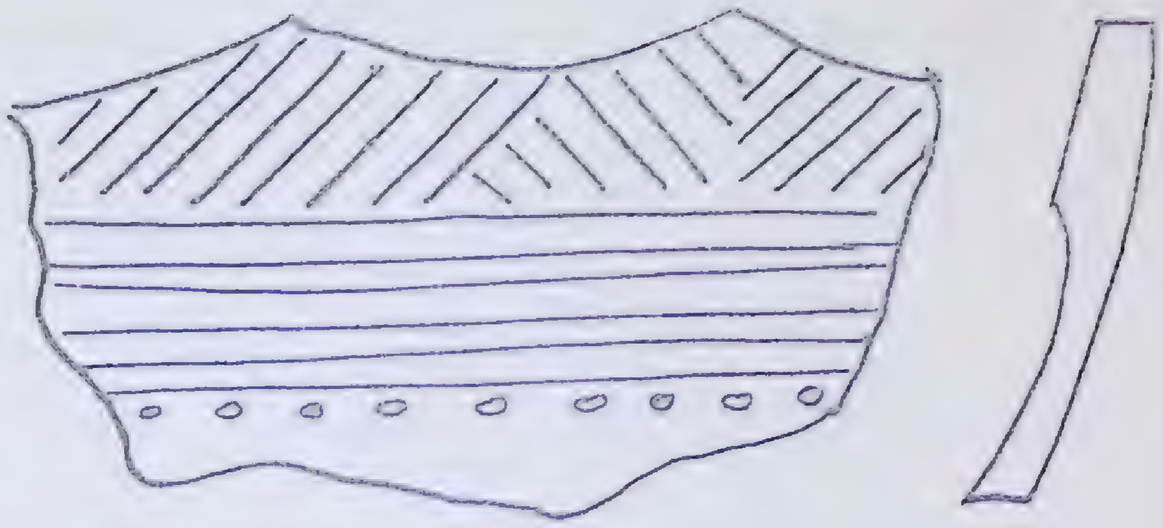


B. Circular Punctate Type 5.2%

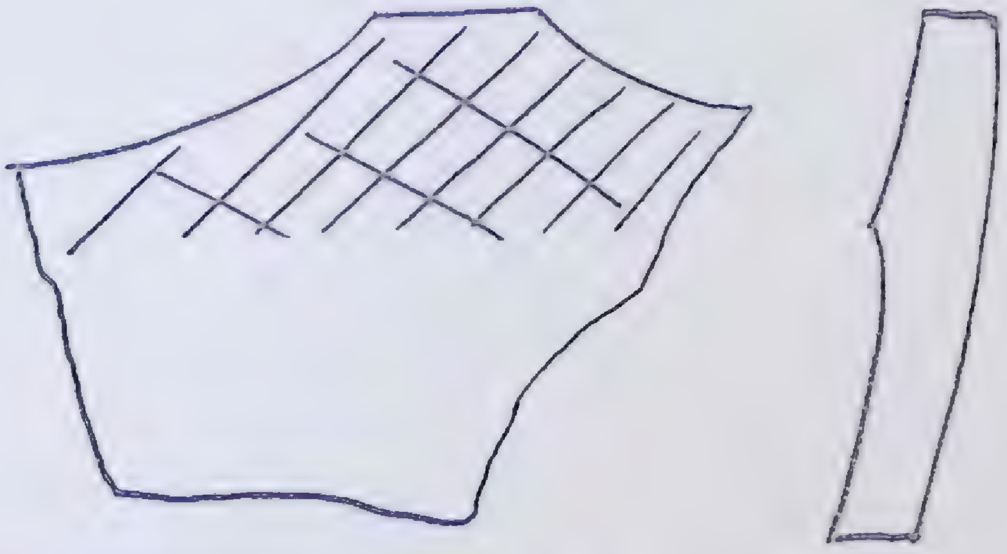


C. Decorated Neck Type 23.6%

FIGURE 23—*Payne castellations* (Cont.)



A. Multiple Type 2.6%



B Broad Turret Type 2.6%

Figure 24—*Payne castellations* (Conc.)

The distribution data presented in Table 32 indicate that the Payne castellations fall into five categories:

(1) Those which are unique to the site
(2) Those shared by almost *all* of the sites
(3) Those shared with only the *early* period sites
(4) Those shared with only the *middle* period sites
(5) Those shared with only the *late* period sites

Considering first the early castellation types in relationship to Payne, it is just as important to note the types absent as those present. The absence of the Rolled Rim and the High Collared Nubbin castellations indicates that Payne is located at the latter end of this early series. This suggestion is confirmed by the great popularity of both the Classic Pointed and Decorated Neck types. The presence of the Multiple Castellation suggests that Payne,

TABLE 32

PERCENTAGE DISTRIBUTION OF CASTELLATION TYPES

		BLACK CREEK	DOWNSVIEW	HARDROCK	BOSOMWORTH	PAYNE	McKENZIE	AURORA	BENSON
	UNCLASSIFIED	0	6.4	0	3.2	0	7.5	13.0	0
EARLY	ROLLED RIM	17.1	24.0	0	9.6	0	15.1	0	.9
	INCIPIENT POINTED	18.5	16.0	9.1	3.2	5.2	15.1	0	22.1
	HIGH COLLARED NUBBIN	5.7	3.2	6.8	12.8	0	0	0	0
	HIGH COLLARED POINTED	5.7	6.4	15.9	6.4	2.6	0	0	0
	CLASSIC POINTED	18.5	16.1	13.6	28.8	49.9	13.2	30.4	9.4
	DECORATED NECK	34.3	17.6	40.9	22.4	23.6	1.9	0	11.0
	TOTAL (1)	98.8	89.7	86.3	86.4	81.3	52.8	43.4	43.4
MIDDLE	MULTIPLE	0	6.4	4.5	3.2	2.6	3.8	8.7	10.3
	INCIPIENT TURRET	0	3.2	9.1	6.4	0	0	4.3	1.8
	TOTAL (2)		99.3	99.9	96.0	83.9	56.6	54.4	55.5
	BROAD TURRET				0	2.6	0	0	11.0
	FACE PUNCTATE				0	7.8	0	0	.8
	CIRCULAR PUNCTATE				3.2	5.2	7.5	0	6.0
	TOTAL (3)				99.2	99.5	64.1	56.4	73.5
LATE	BROAD MULTIPLE						13.2	4.3	.9
	GROOVED AND NOTCHED						16.9	8.7	6.0
	TURRET						2.6	30.4	18.7
	TOTALS (4)						99.5	99.8	99.1

Bosomworth, and Hardrock are contemporaneous. The Punctated Face and the Circular Punctate types suggest a closeness to McKenzie and indicate that Payne existed after the occupations of Black Creek and Downsview. The complete absence of the Grooved, Notched, Classic Turret, and Broad Multiple castellations definitely indicates that Payne existed well before the later prehistoric and contact period villages such as Aurora and Benson.

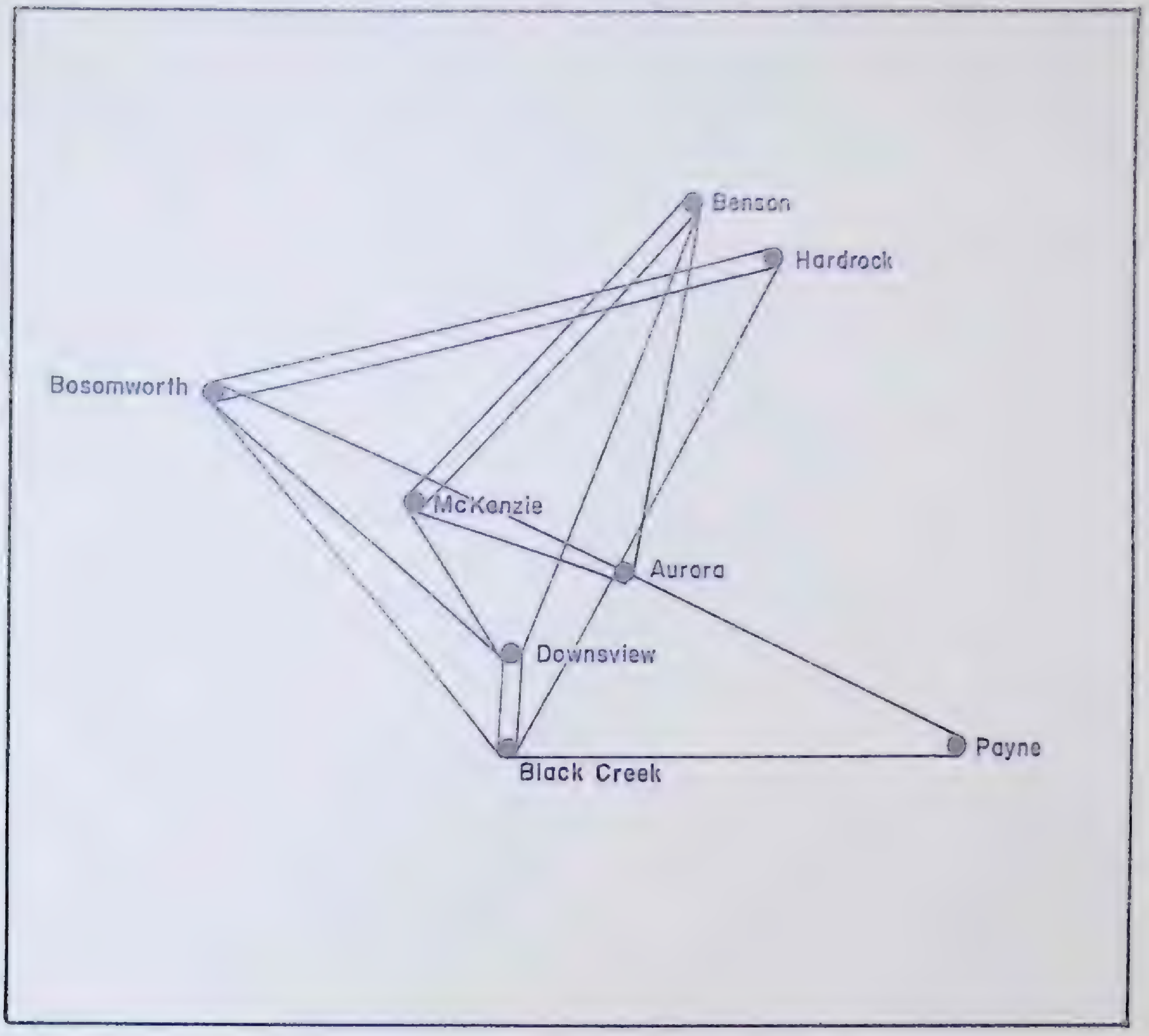


FIGURE 25—*Configuration map based on castellation analysis*
This configuration map is produced by drawing a solid black line between a site and the ones with which it shares the highest and second highest percentages of similarity.

Finally, the coefficients of similarity based upon the percentage distribution of castellation types were calculated (*see* Table 33). Once again the distribution does not completely fit the ideal, but any other arrangement of the series leads to equal, if not greater, distortion. The position of Payne again is clear; it is most closely related to the early sites in the series such as Bosomworth and Black Creek. This information is more clearly, but perhaps more complexly, illustrated in the site configuration map, Figure 25. In this map all those sites showing a first and second degree of relationship based on the coefficients are joined by solid black lines. As was the case when studying pottery types, site 'clusters' appear. Black Creek and Downsview are linked,

TABLE 33

COEFFICIENTS OF SIMILARITY BASED ON CASTELLATION ANALYSIS

	AURORA	BENSON	McKENZIE	DOWNSVIEW	BLACK CREEK	BOSOMWORTH	HARDROCK	PAYNE
AURORA		92	91	48	37	70	45	65
BENSON	92		100	95	78	72	46	72
McKENZIE	91	100		104	90	75	53	65
DOWNSVIEW	48	95	104		153	122	115	91
BLACK CREEK	37	78	90	153		133	138	100
BOSOMWORTH	70	72	75	122	133		123	121
HARDROCK	45	46	53	115	138	123		98
PAYNE	65	72	65	91	100	121	98	

as are Bosomworth and Hardrock. The prehistoric McKenzie site is closely related to the contact period Benson site. Payne and Aurora are both peripheral to the main stream of these developmental groupings.

In summary, the castellation analysis suggests the following construction of history and Payne's part in it:

The Black Creek site was again ancestral to the sites studied. A broad areal distribution was present at this stage connecting Bosomworth, Hardrock, and Black Creek. Payne was connected peripherally to this development, but the Black Creek tradition was mainly superseded by Downsview. The later developments were begun by the McKenzie site people and carried on to historic times. Payne had ceased to be by McKenzie times. Thus, in all essential features the castellation analysis confirms the findings revealed by both the pottery type and pipe analyses.

CONCLUSIONS AND SPECULATIONS

In the body of this report, I have commented on considerable data from the Payne site. I have noted comparative distributions and have presented thoughts on the chronological and cultural attributes of the Payne village and its people. My task now is to assemble these observations and speculations in the light of a general knowledge of Iroquois prehistory and cultural development, a task which involves seeking the answers to three questions, namely: what is the place of the Payne village in history; to what degree is it the product of potent cultural forces; and what have I learned of the nature of the people themselves?

First, it can be said the Payne site is an early middle period Iroquois village and makes no contribution to Ontario Iroquois origins. Ontario Iroquois began with such sites as Goessens, Boys, Barrie, and others described by Ritchie (18, 19), Ridley (16), and Lee (10, p. 15). Kenyon's Miller site is also pertinent (9). Development at these sites led to an eastern and western division of the Iroquois in Ontario. Goessens led to the Uren–Middleport stage of development. This bifurcated to produce the Neutral sequence on the one hand and the Black Creek series leading to historic Huron on the other. Shortly after the Black Creek stage, Payne takes part in the development of Huron (7). Payne's historic position as shortly post-Black Creek is substantiated by the data analysed. The subsequent relationship of Payne is in doubt, but such should be found northward in the Trent Valley by future excavation.

The cultural position of the Payne site is a matter of speculation. It appears to be the product of broad cultural and social trends taking place in Iroquois society at the time. These include the development of agriculture, the growth of village life, and the increase of semi-sedentary populations. Considering the abundance of animal bones in relationship to agricultural products, and the extent of village acreage, there has been an increase in population and village size between the Uren–Middleport stage and the Black Creek stage of Iroquois. Agriculture is still very much secondary to hunting and gathering. This condition persists until well after McKenzie times, and agriculture only becomes primary at contact times and later. Thus, at the Black Creek stage one finds the phenomenon of both large (ten acre) and small (three acre) villages being occupied simultaneously. Payne is one of the latter. This raises the problem of function.

The fact that villages become larger suggests an increase in population at Black Creek times, but it is very doubtful that this is the result of a more stable food supply based on agriculture. The alternatives would seem to be the development of more efficient hunting techniques, or more abundant game, or better protection from hostile neighbours. The fact that one finds an increasing tendency toward large, well-protected, heavily palisaded villages like Black Creek would lend credence to the latter theory. The smaller villages, such as Payne, are however largely unprotected and assailable. This would suggest that they serve as outlier 'sentinel' and 'explorer' type villages and are satellites of the larger nuclear centres. The 'sentinel' villages would be so located as to give warning of hostile tribes entering the area. They could then withdraw to the larger villages if attacked. The 'explorer' villages could be moving into a new area and assessing its potential to accommodate the larger villages that were to move in later. Payne in its location would serve well as a sentinel village overseeing the routes from eastern New York and eastern Ontario. The paucity of trade sherds indicates the lack of close relationships with the contemporary eastern Iroquois peoples at that particular time period. Prince Edward County was not a likely area of Iroquois occupation, and in terms of the number of sites located there, it never did become so. This line of thought on function is obviously speculative, but it is one which I believe can be pursued with profit. It will become necessary to find criteria to assess the function of such villages.

Finally, there is the problem of the nature of the Payne people themselves. The all-pervasive characteristic of these people is a strong and traditional conservatism. This is most manifest in the rigorous manner in which their ceramics are time-honoured reproductions of patterns handed down for generations from their ancestors. They lived in a small village world, but this world had broad horizons. It appears that they were in constant communication with peoples to the west but were strangely free from contact to the east. There is little evidence of inventiveness or initiative present: ceramics forms and design motifs change but slowly. The very smallness, the meagreness of their material remains, especially their pipes, seems to suggest an impoverished people who were carrying out a very desperate struggle for survival. Animal bones are broken into tiny fragments; flint is scarce; and one is left with the impression that every last item of material was utilized until there was no more good in it. There is none of the profligate abundance and lack of utilization that characterizes the Iroquois villages a few decades later. Payne was a peripheral village to the main Iroquois area, managing to survive in what must have been a difficult period of transition and struggle, the shift from nomadic hunting and gathering to a semi-sedentary agricultural way of life.

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I am also grateful for the institutional backing, financial and otherwise, which supported this work: the Department of Education of the Provincial Government, the National Museum of Canada, and the University of Toronto. I am particularly indebted to Dr. L. S. Russell, former Director, and Dr. R. S. MacNeish, former Chief Archaeologist, of the National Museum for their sustained interest and support. I hope that this report will in part vindicate the faith they have shown in their cooperation with the University of Toronto in joint efforts. Great credit is due the late Professor T. F. McIlwraith,

former Head of the Department of Anthropology, University of Toronto, for his cooperative concurrence in both the broad policy and the immediate objectives of our departmental program which included the excavation of the Payne site.

I am also extremely appreciative of the excellent work by Mr. Bruce Drewitt, Field Director, and his assistants who so successfully completed the excavation part of the project.

Finally, I wish to thank Dr. William E. Taylor, Jr. for the diligent and comprehensive way he editorially devastated my original submissions for publication. I am indeed grateful to him for what has been a salutary learning experience in the field of site reporting.

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APPENDIX A

CERAMIC TYPES AT THE PAYNE SITE

This appendix on pottery types from the Payne site has been prepared for two reasons; first, to present the research student with the type of detail necessary for adequate pottery typing. Every analysable rim sherd from the site is diagrammed in the charts that follow, as well as in the master charts in Appendix B. This allows the reader a full opportunity to re-analyse the data; it largely eliminates the difficulty encountered in many reports where the pottery is recorded simply as raw numbers and percentages and is inadequately diagrammed. Without this full presentation the reader is left dependent upon the writer's ability to type pottery in a field that is, as yet, very close to a fine art. Even with the desire to provide the researcher with as much detail as possible, it will be realized that the diagrammatic approach used represents a considerable generalization from the real potsherds. However, I hope that here a happy medium has been met between presenting no data and the alternative of photographing every item.

Secondly, the diagrams and information to follow will be a helpful guide to the neophyte embarking upon the tedious task of typing pottery. Within limits, the pottery types are presented in their cultural and historical order.

a) Middleport Oblique

5.07% 13 sherds

MacNeish considers the diagnostic features of Middleport Oblique to be the use of short, parallel oblique lines on the upper rim with notches, horizontal line or lines, or linear punches on the lower rim or at the base of an incipient collar (11, p. 16). His illustrations indicate that concave interior rim contours are also characteristic. Payne produced thirteen rim sherds conforming to this definition. Eleven of the rims possess the poorly developed or incipient collar (Form E) and the interior concavity; the remaining two rims deviate in the direction of a more definite basal collar development. Designs 45 and 46 conform admirably with MacNeish's definition. Designs 47 and 48 are included as variants, being closer to this than to other Neutral area types.

Because Middleport Oblique is an early Iroquois ceramic type with an occurrence of 15 per cent at Middleport, 16 per cent at Pound, and 3 per cent at Black Creek, its 5 per cent occurrence at the Payne site relates it most closely to Black Creek in time. Because of its limited distribution in time and space this particular type is a valuable time marker.

Middleport Oblique includes rim sherds in the A45, B48, E45, E46, and E47 categories in the master rim sherd charts.

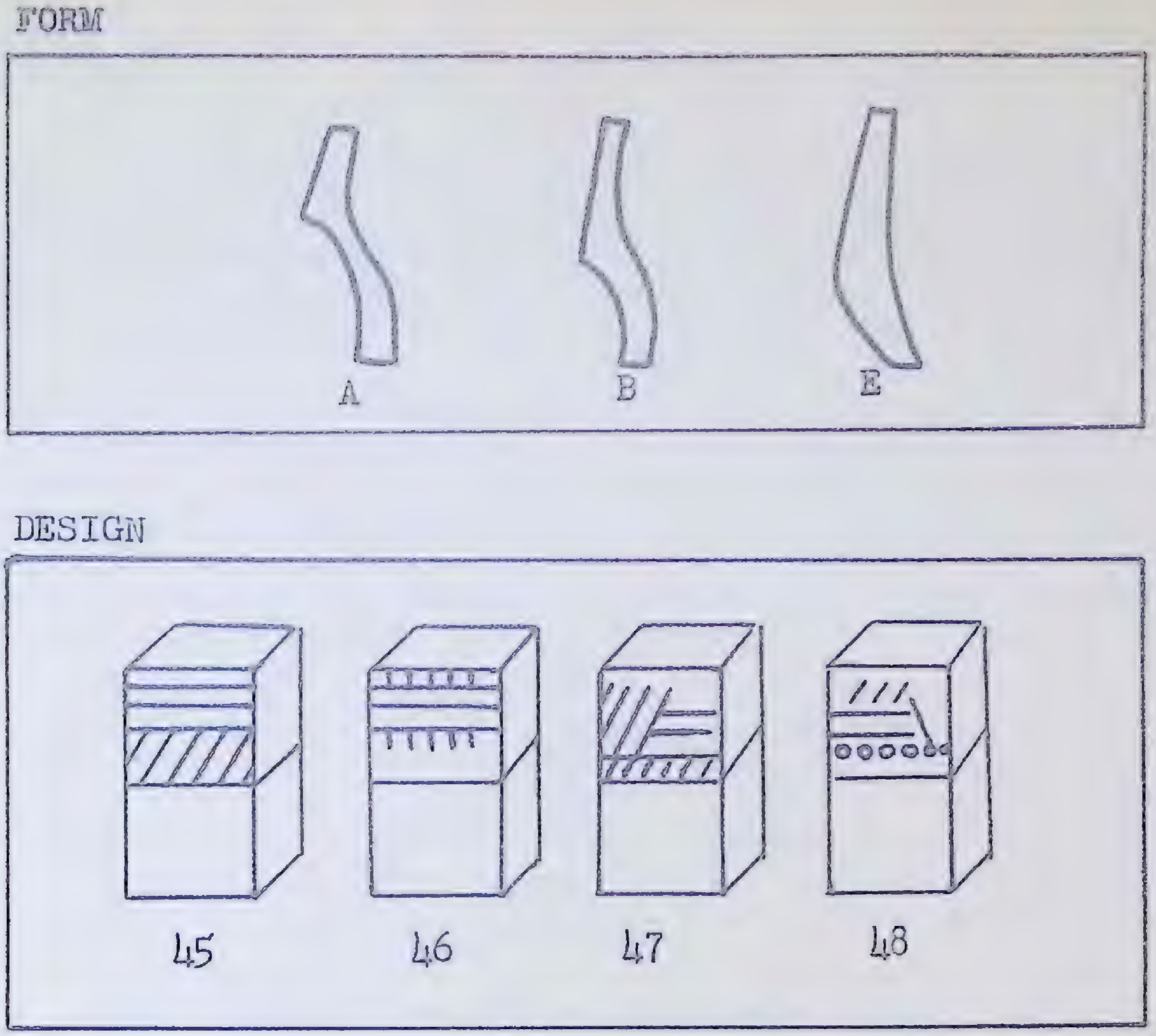


Figure 26a—*Middleport Oblique*

FORM

		A	B	E	
DESIGN	45	1		5	6
	46			4	4
	47			2	2
	48		1		1
		1	1	11	13

Figure 26b—*Form-design relationships*

b) Ontario Horizontal

3.12% 8 sherds

Eight rim sherds conform to MacNeish's definition (11, p. 16) of this type. A very popular one at Uren (47%), Middleport (35%), Pound (24%), and Black Creek (12%), it was found at all other sites studied as a very minor type (1%) except at McKenzie (4%). The presence of this early ceramic type at Payne suggests a temporal position somewhat later than Black Creek.

Ontario Horizontal includes rim sherds in the B9, C9, and E8 categories of the master rim sherd charts.

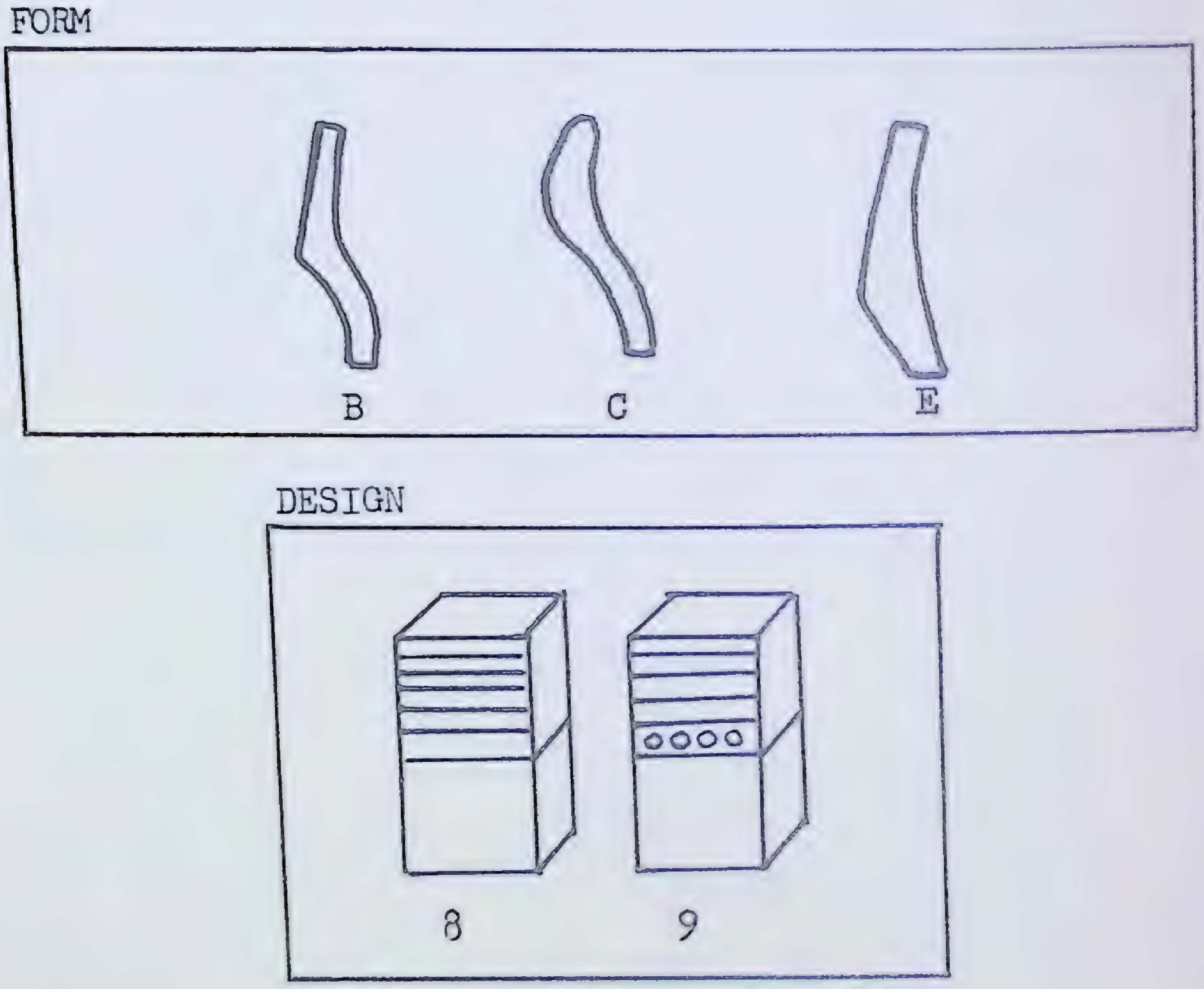


Figure 27a—*Ontario Horizontal*

FORM

DESIGN	B	C	E		
8			6	6	
9	1	1		2	
	1	1	6		8

Figure 27b—*Form-design relationships*

c) Lawson Incised

21.84% 56 sherds

Lawson Incised was the most popular ceramic type found at Payne. Fifty-six of these rims were excavated. They exhibit a somewhat wider range of form and design than suggested by MacNeish's definition (11, p. 14). However, the most popular designs (1, 4, and 11) and forms (C and E) are identical with MacNeish's. These account for forty-nine of the fifty-six forms, and thirty-three of the designs. This suggests that this type had a slightly wider range in form and a considerably larger range of design than MacNeish encountered. The form deviation is in the direction of a more definite collar development (Forms B, D, and H). Design variants have been increased by including cross-hatched items (14–16) and rims with crossing lines (5, 6, 37, 7, and 13). These have been included because they have similarities in form and also because they are not numerous enough to suggest the definition of a new type.

Lawson Incised was an important and widespread type. It was most prominent at Lawson (52%), but it was quite popular also at Middleport (12%), Black Creek (11%), and McKenzie (11%). This type also makes up 47 per cent at the Bosomworth site and 31 per cent at the Parsons site. The Lawson site is placed late in the Neutral sequence by both MacNeish and Wintemberg. Thus it would appear that Payne again existed after Black Creek when the influence of Lawson was being felt at both Bosomworth and Parsons.

Lawson Incised includes rim sherds in the B2, B7, B57, C1, C2, C3, C4, C5, C6, C10, C11, C13, C14, C15, C37, D3, E1, E2, E11, E12, E14, E15, E16, and H4 categories in the master rim sherd charts.

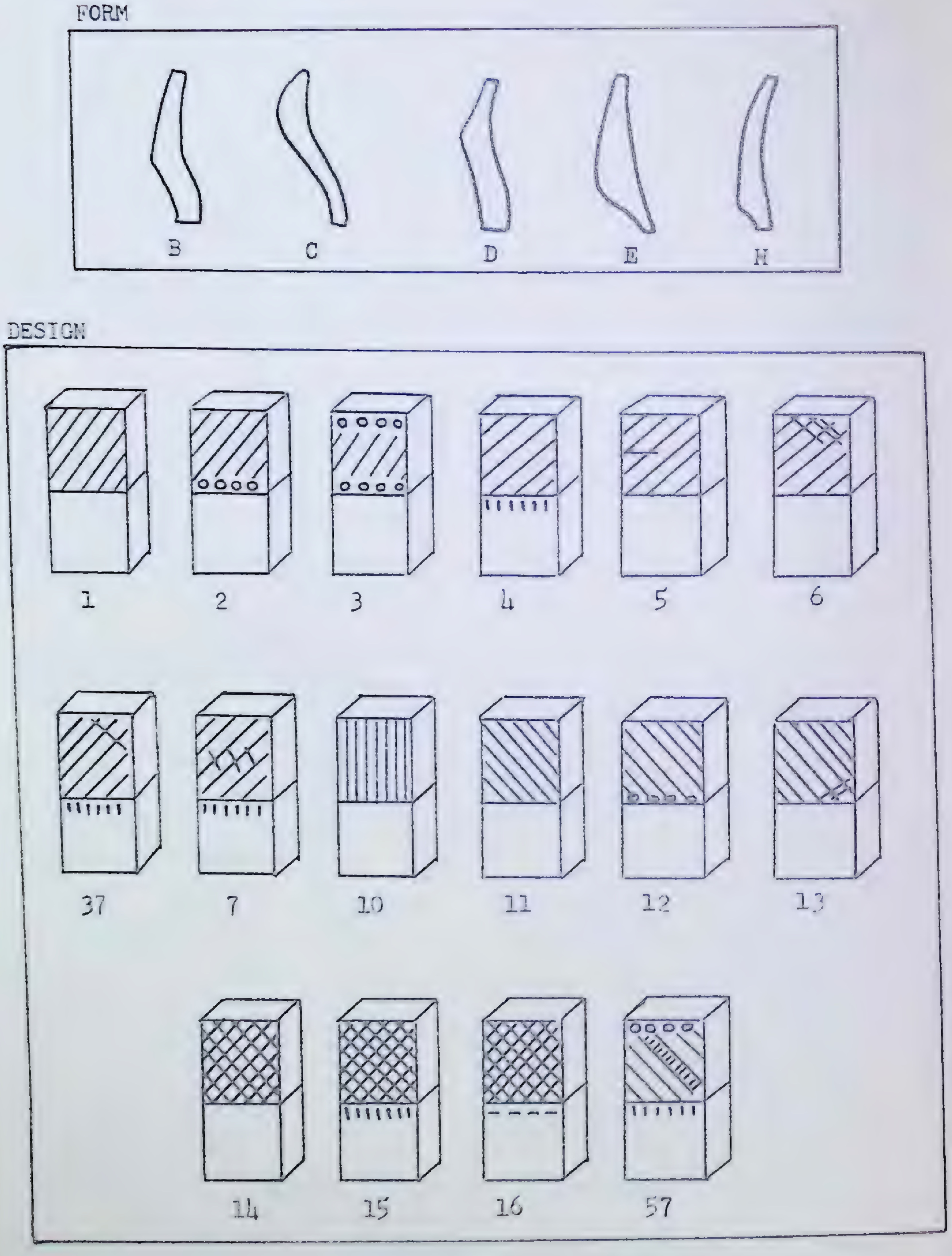


FIGURE 28a—*Lawson Incised*

	FORM					
DESIGN	B	C	D	E	H	
1		11		4		15
2	1	1		1		3
3		2	1			3
4		5		1	3	9
5		2				2
6		1				1
37		1				1
7	1					1
10		2				2
11		7		2		9
12		1		2		3
13		1				1
14		1		1		2
15		1		1		2
16				1		1
57	1					1
	3	36	1	13	3	56

FIGURE 28b—*Form-design relationships*

d) Lawson Opposed

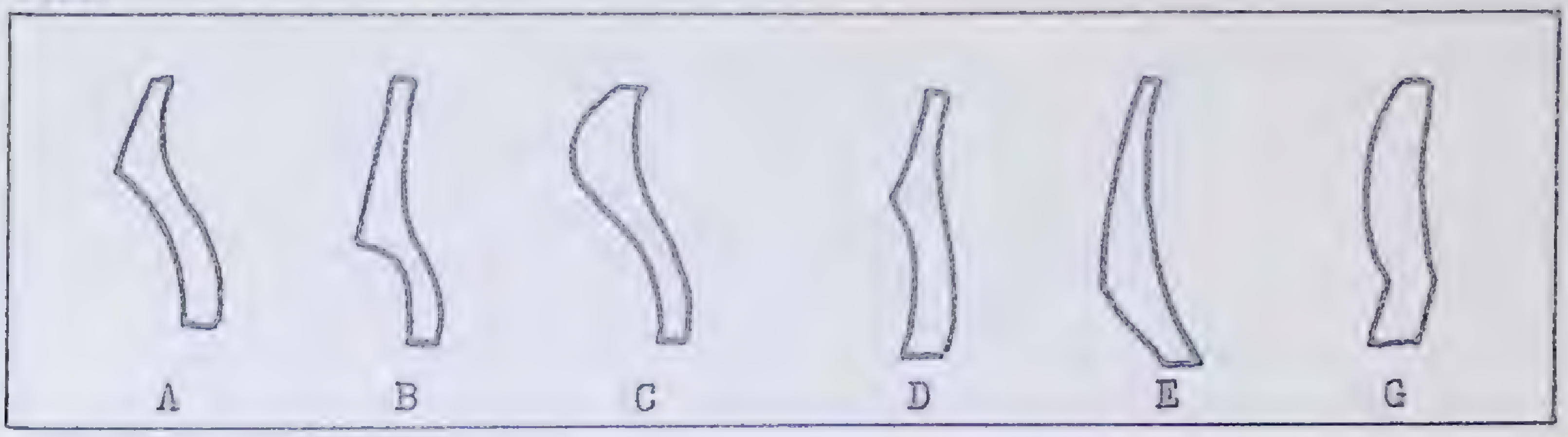
11.70% 30 sherds

This was an important minor ceramic type at this site. Thirty rim sherds were found. Like Lawson Incised, this type exhibits a wider range of form and design than suggested by MacNeish (11, p. 13). Two-thirds are, however, identical (Form C). The main form deviation is toward a sharper definition of the collar (Forms A, B, and D). In addition to the opposed oblique lines stressed by MacNeish, the horizontal lines combined with oblique lines to form the decoration motif. Punctates also occur fairly frequently.

Lawson Opposed was just as prominent at Payne as at the type site, Lawson (11%). This suggests a close cultural relationship. At Black Creek, it was a very minor type (3%). This again suggests placing Payne temporally and culturally later than Black Creek times.

Lawson Opposed includes rim sherds in the A29, B17, B27, C17, C18, C22, C23, C24, C25, C26, C28, C29, C32, D29, E19, E30, G23, G31, and G33 categories in the master rim sherd charts.

FORM



DESIGN

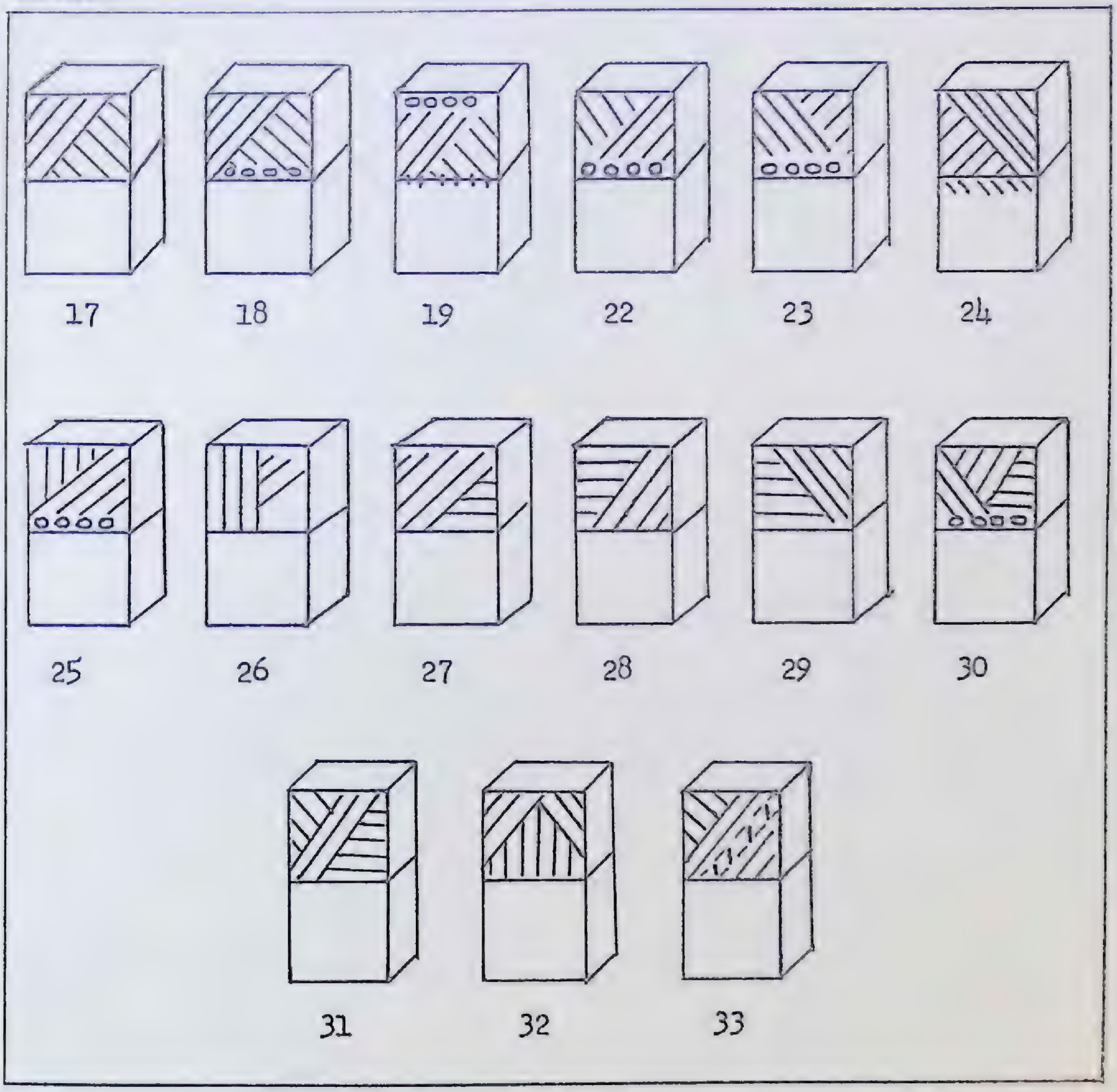


Figure 29a—*Lawson Opposed*

FORM-DESIGN RELATIONSHIPS

FORM

DESIGN	A	B	C	D	E	G	
17		1	5				6
18			4				4
19					1		1
22			1				1
23			2			1	3
24			1				1
25			1				1
26			1				1
27		1					1
28			2				2
29	2		2	1			5
30					1		1
31						1	1
32			1				1
33						1	1
	2	2	20	1	2	3	30

Figure 29b—*Form-design relationships*

e) Pound Necked

12.09% 31 sherds

This is a prominent minor type. Thirty-one rims were encountered. The design elements conform quite favourably to MacNeish's definition (11, p. 14). However, there was considerable deviation in form attributes. This shows itself in shifts toward a more clearly defined collar and from a concave to a convex interior rim contour. This change in form emphasizes the 'dynamic' feature that must be expected in pottery types which were in a state of change. The development here was from an early Neutral form to one which was more characteristically Huron. The presence of the diagnostic horizontal line neck decoration makes it imperative to include these sherds in the Pound Necked category.

Pound Necked was a Neutral Iroquoian ceramic type and was popular at Pound, the type site (46%). Otherwise, it was important as a minor type

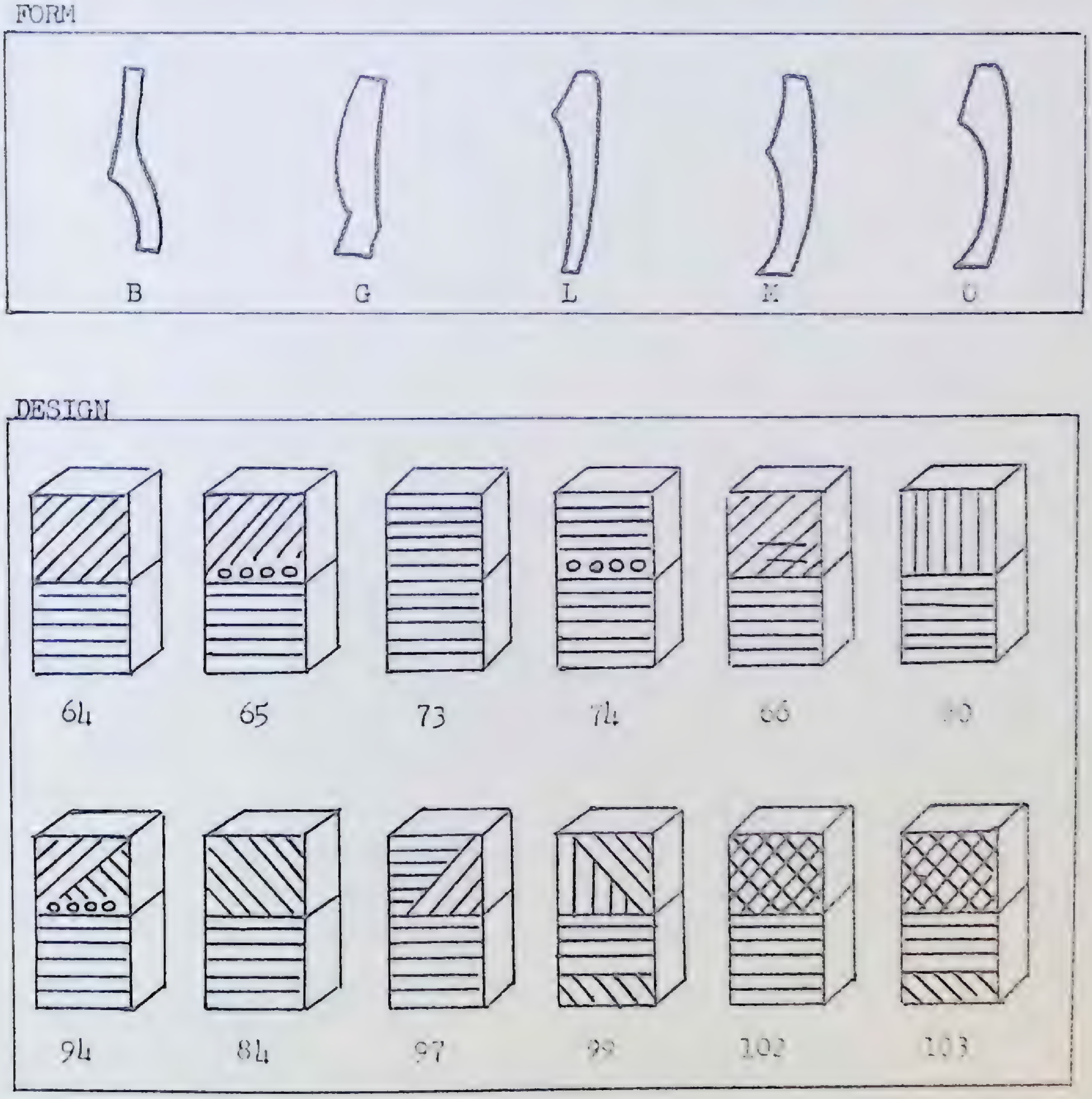
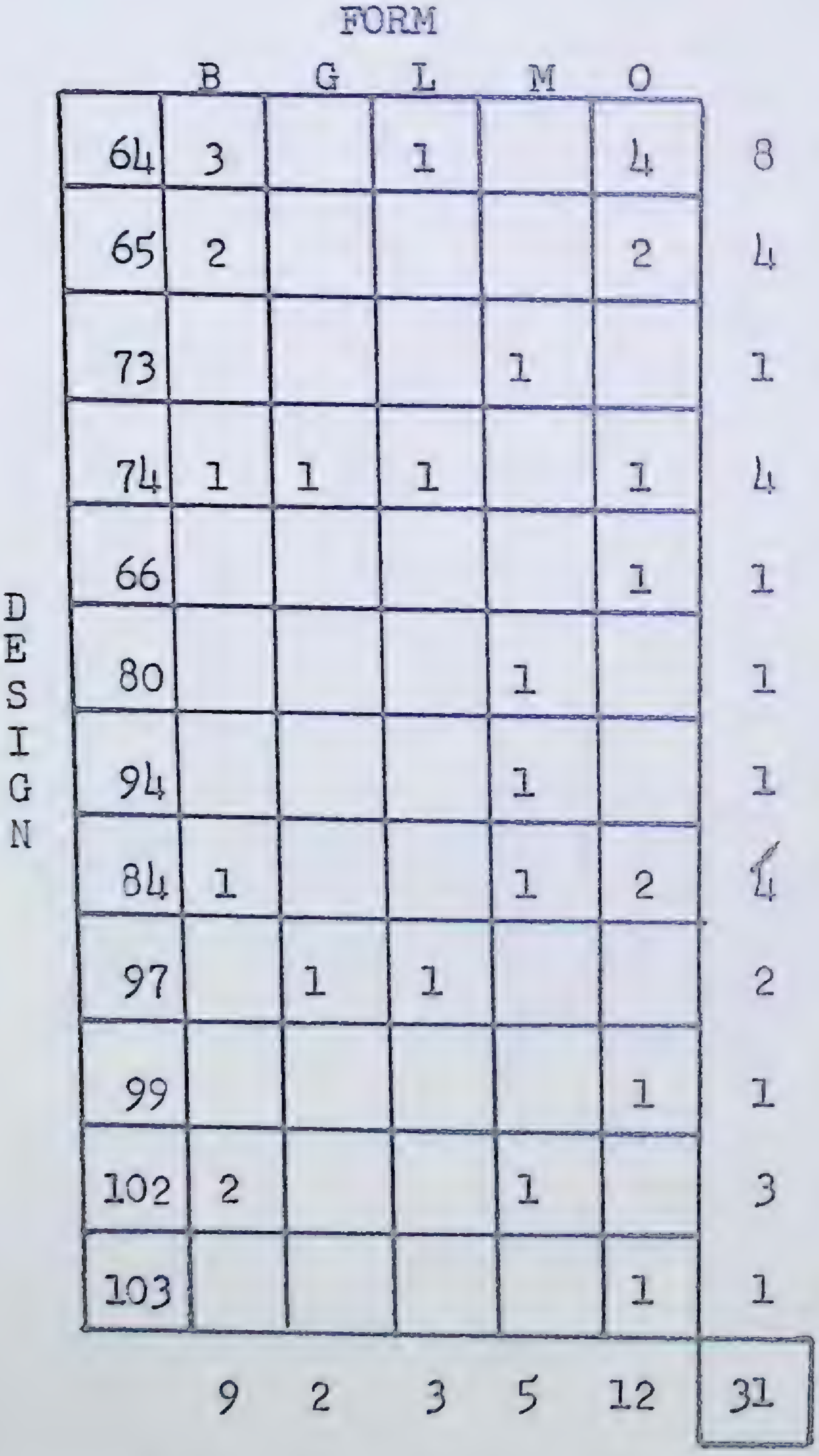


Figure 30a—*Pound Necked*

at Lawson (11%) and Parsons (11%). Its distribution otherwise was restricted to Middleport (2%) and Black Creek (3%). Thus its presence at Payne again emphasizes the closeness of this site to Lawson and Parsons, and places it in time after Black Creek.

Pound Necked includes rim sherds in the B64, B65, B74, B84, B102, G74, G97, L64, L74, L97, M73, M80, M84, M94, M102, O64, O65, O66, O74, O84, O99, and O103 categories in the master rim sherd chart.



	FORM					
DESIGN	B	G	L	M	O	
64	3		1		4	8
65	2				2	4
73				1		1
74	1	1	1		1	4
66					1	1
80				1		1
94				1		1
84	1			1	2	4
97		1	1			2
99					1	1
102	2			1		3
103					1	1
	9	2	3	5	12	31

Figure 30b—*Form-design relationships*

f) Black Necked

20.28% 52 sherds

Fifty-two rim sherds of this type were obtained from Payne. Along with Lawson Incised, it was the most popular ceramic type found. Black Necked is a complex ceramic type. It includes thirty-two design variants combined with five forms. The range of variation here corresponds quite closely with the definition offered by MacNeish (11, p. 36). It was evidently a 'transitional' ceramic type in terms of form, including both Neutral (Form B) and typical Huron shapes (Forms N and O).

Black Necked was popular at Black Creek (30%). It was completely absent from the Neutral area and occurred as a minor type at most sites in the Humber Valley and Huronia. Its prominence at Payne represents the best evidence for a historical connection with Black Creek, coming somewhat later in time.

Black Necked includes rim sherds in the A83, A89, A95, B60, B67, B68, B 70, B71, B79, B81, B82, B86, B90, B91, B92, B93, B98, B101, N60, N69, N76, N77, N79, N81, N82, N85, N87, N88, N92, N98, O61, O62, O63, O69, O72, O75, O78, O79, O83, O85, O91, O95, O96, O98, and P100 categories in the master rim sherd chart.

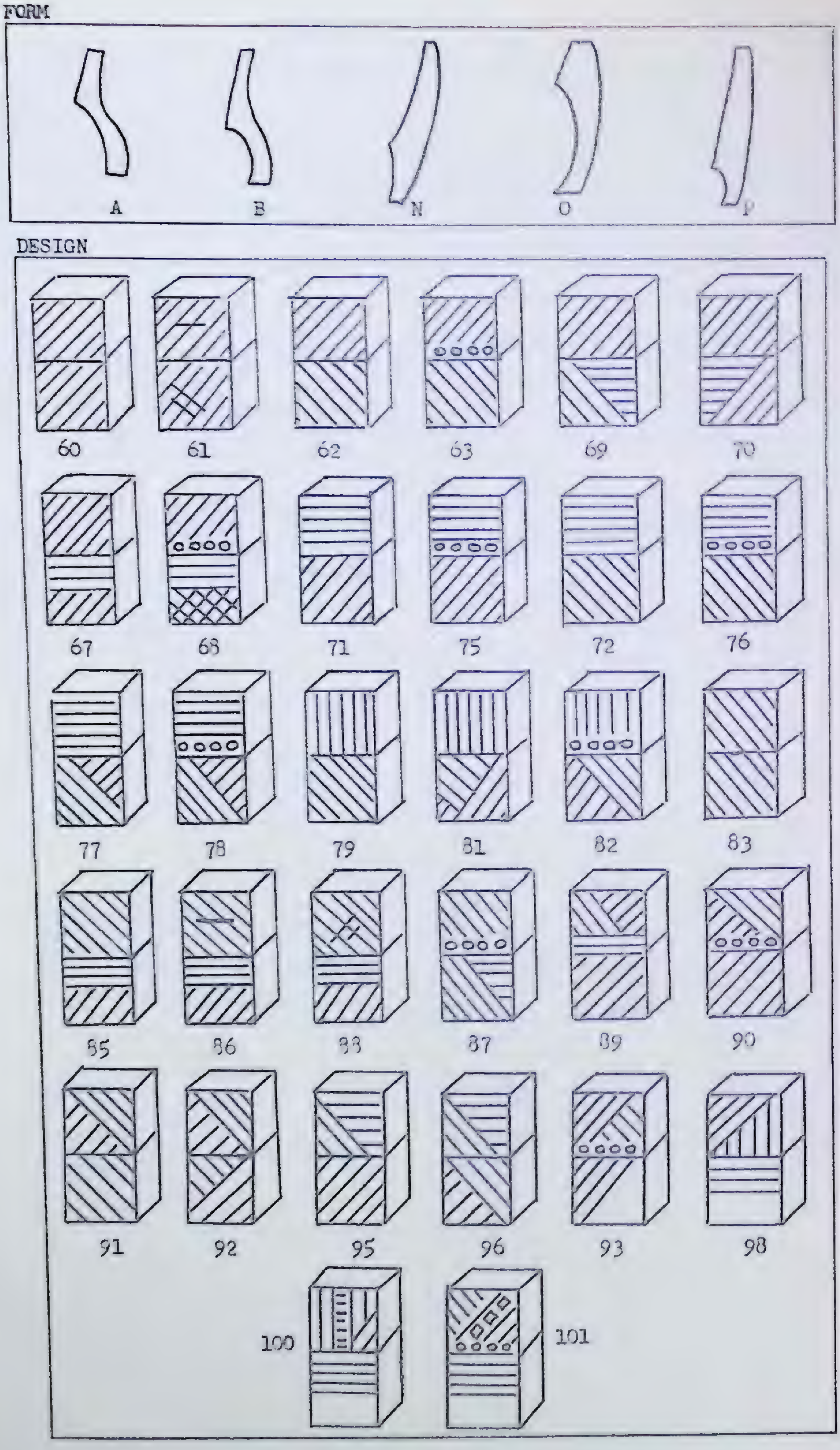


FIGURE 31a—*Black Necked*

FORM

DESIGN	A	B	N	O	P	
60		3	1			4
61				1		1
62				2		2
63				1		1
69			1	1		2
70		1				1
67		1				1
68		1				1
71		1				1
75				1		1
72				1		1
76		1	1			2
77			1			1
78				1		1
79		2	1	1		4
81		1	1			2

FORM

DESIGN	A	B	N	O	P	
82		1	1			2
83	1			1		2
85			1	1		2
86		1				1
88			1			1
87			1			1
89	1					1
90		1				1
91		1		1		2
92		1	1			2
95	1			2		3
96				2		2
93		1				1
98		1	1	1		3
100					1	1
101		1				1
	3	19	12	17	1	52

FIGURE 31b—*Form-design relationships*

g) Lalonde High-Collared

.78% 2 sherds

Only two rims of the High-Collared type were found at Payne. This type was defined by Ridley (14) and was apparently not distinguished and isolated as a type by MacNeish in his pioneer survey. A few sherds were encountered at Black Creek. This type becomes more prominent as one moves northward to Huronia where Ridley has sharply separated Lalonde from Huron sites. The Payne rims do not quite reach the large size of the classic Lalonde but are more like smaller counterparts reported from Innisfil Township (13) by Robert E. Popham. The evidence is sparse, but it suggests that Payne may have existed during the period when the Lalonde High-Collared pottery was just developing, somewhat after Black Creek times.

Lalonde High-Collared includes rim sherds K50 in the master rim sherd charts.

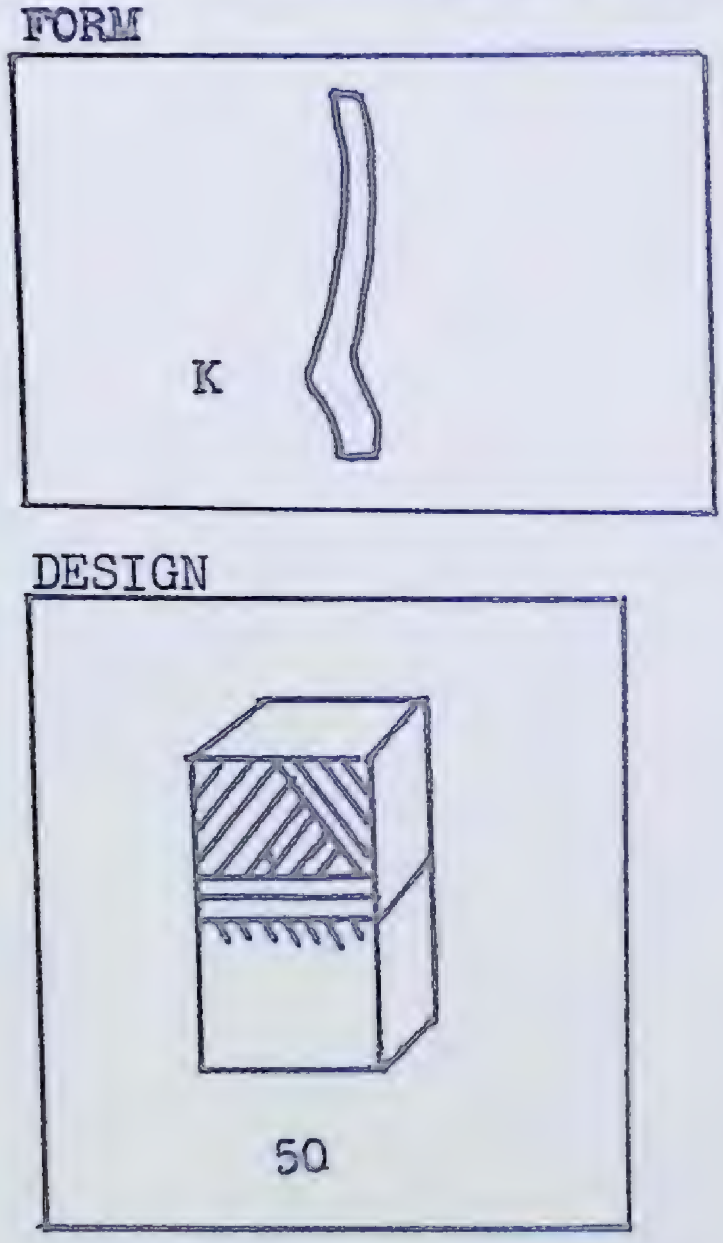
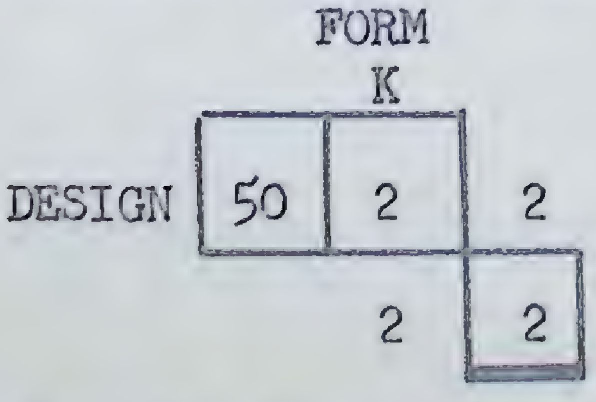


FIGURE 32a—*Lalonde High-Collared*



DESIGN \ FORM	K	
50	2	2
	2	2

FIGURE 32b—*Form-design relationships*

h) Huron Incised

12.48% 32 sherds

Thirty-two rim sherds of Huron Incised were found, representing an important ceramic type and emphasizing the developmental status of the village. The twelve design motifs and the four form variations correspond quite closely to MacNeish's (11, p. 34) definition of this ceramic type. The type was virtually absent in the Neutral area but prominent in the Humber Valley and dominant in the historic Huron area. Its 12.4 per cent occurrence here suggests that Payne may have preceded Black Creek in time and perhaps was playing a part in the early development of Huron Incised as a ceramic type. The fact that this type makes up 23 per cent at Black Creek and 35 per cent at McKenzie, while it makes up 11 per cent at Bosomworth and 16 per cent at Parsons, makes the interpretation of these figures difficult, to say the least. Rather than suggest at this point that Payne preceded Black Creek in time, it is more consistent with the facts to state that after Black Creek there was a drop in the popularity of Huron Incised because of an increased stress upon Lawson Incised. Thus 12.4 per cent Huron Incised is evidence that the Payne site is post-Black Creek.

Huron Incised includes rim sherds in the J35, N12, N24, O1, O2, O10, O11, O12, O20, O34, O38, P1, P2, P10, P28, and P36 categories in the master rim sherd charts.

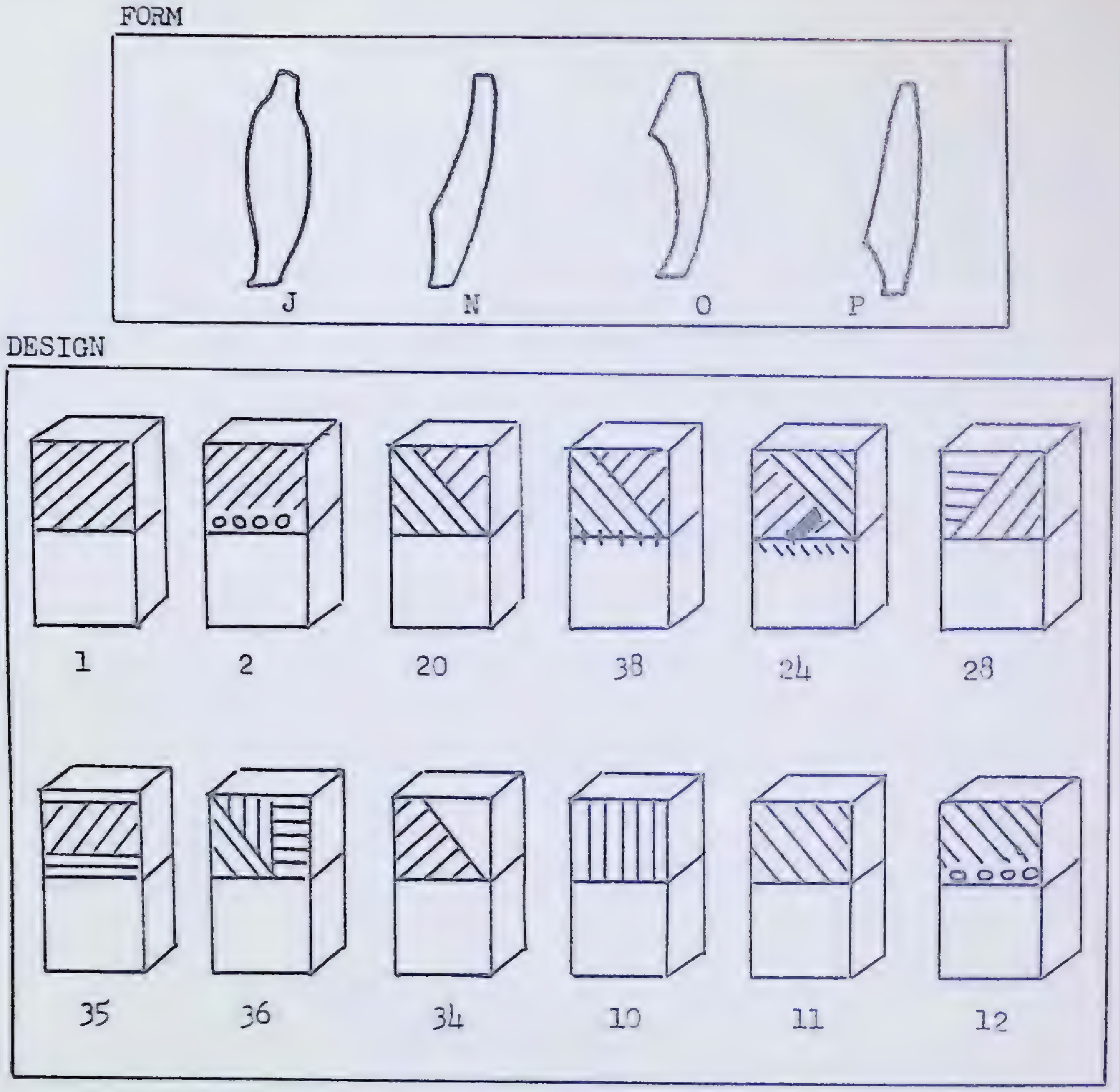


Figure 33a—*Huron Incised*

	FORM				
DESIGN	J	N	O	P	
1			13	1	14
2			2	1	3
20			1		1
38			1		1
24		1			1
28				1	1

	J	N	O	P	
35	1				1
36				1	1
34			2		2
10			1	1	2
11			2		2
12		1	2		3
	1	2	24	5	32

Figure 33b—*Form-design relationships*

i) Seed Incised

1.95% 5 sherds

Only five of these rim sherds were found. It was a rather restricted pottery type, being prominent only at the Seed site itself (26%) and an important minor type at McKenzie (7%) and Sidey-Mackay (8%) (11, p. 35). It occurred also at Lawson and Black Creek (1%). This tends to emphasize the closeness of Payne and Black Creek. Seed Incised was confined to a single design motif, but it occurred with five form variations.

Seed Incised includes rim sherds in the A56, C56, D56, M56, and O56 categories in the master rim sherd charts.

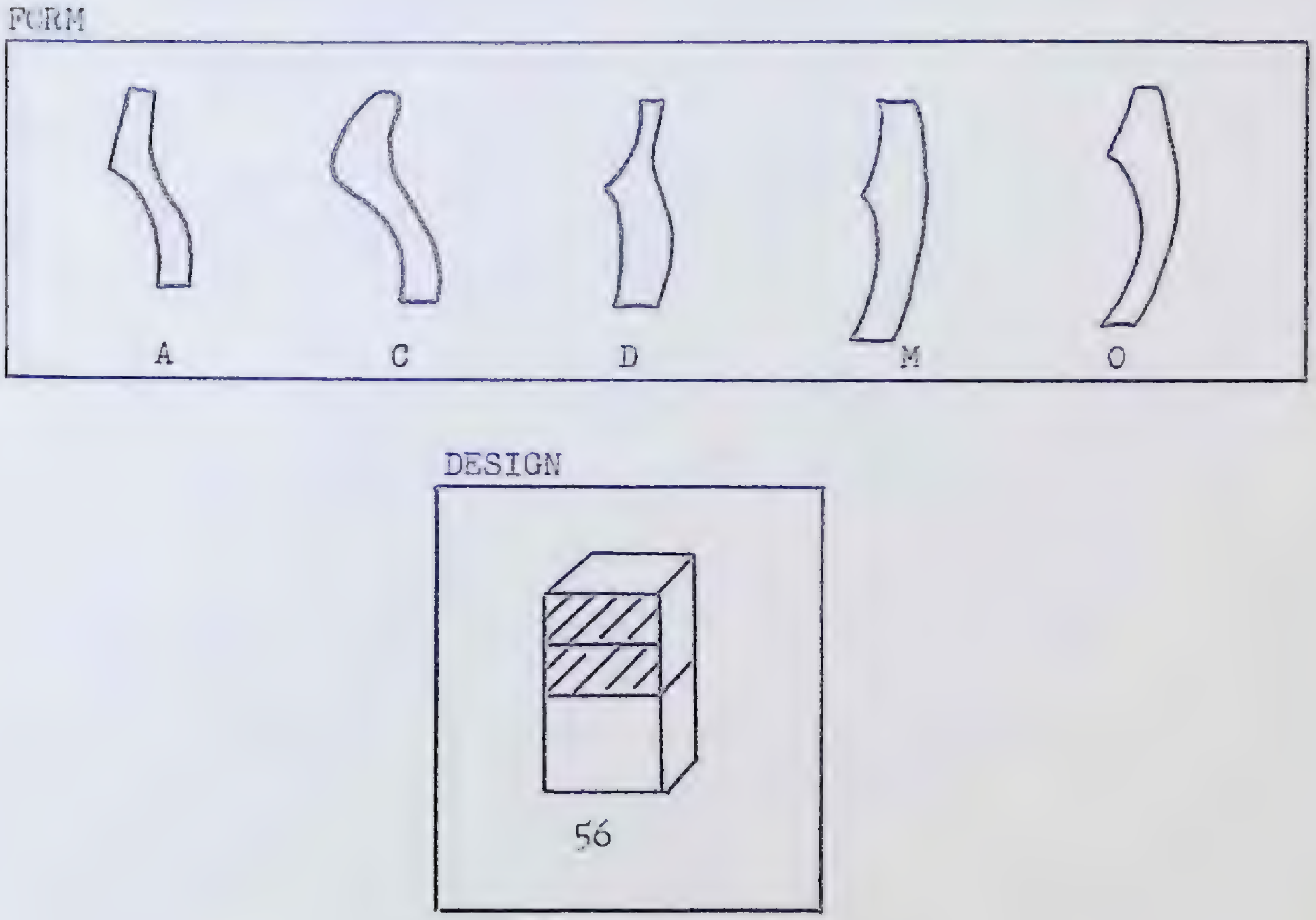


FIGURE 34a—*Seed Incised*

		FORM					
		A	C	D	M	O	
DESIGN	56	1	1	1	1	1	5
		1	1	1	1	1	5

FIGURE 34b—*Form-design relationships*

j) Sidey Notched

.78% 2 sherds

There were only two Sidey Notched rims at Payne (*see* M21 and O21). This was a very typical late prehistoric and historic period Huron ceramic type (11, p. 33). It was completely absent in the Neutral area. These may have been trade sherds, or they may more likely suggest that certain Huron types were in the process of development about the time of the Payne site.

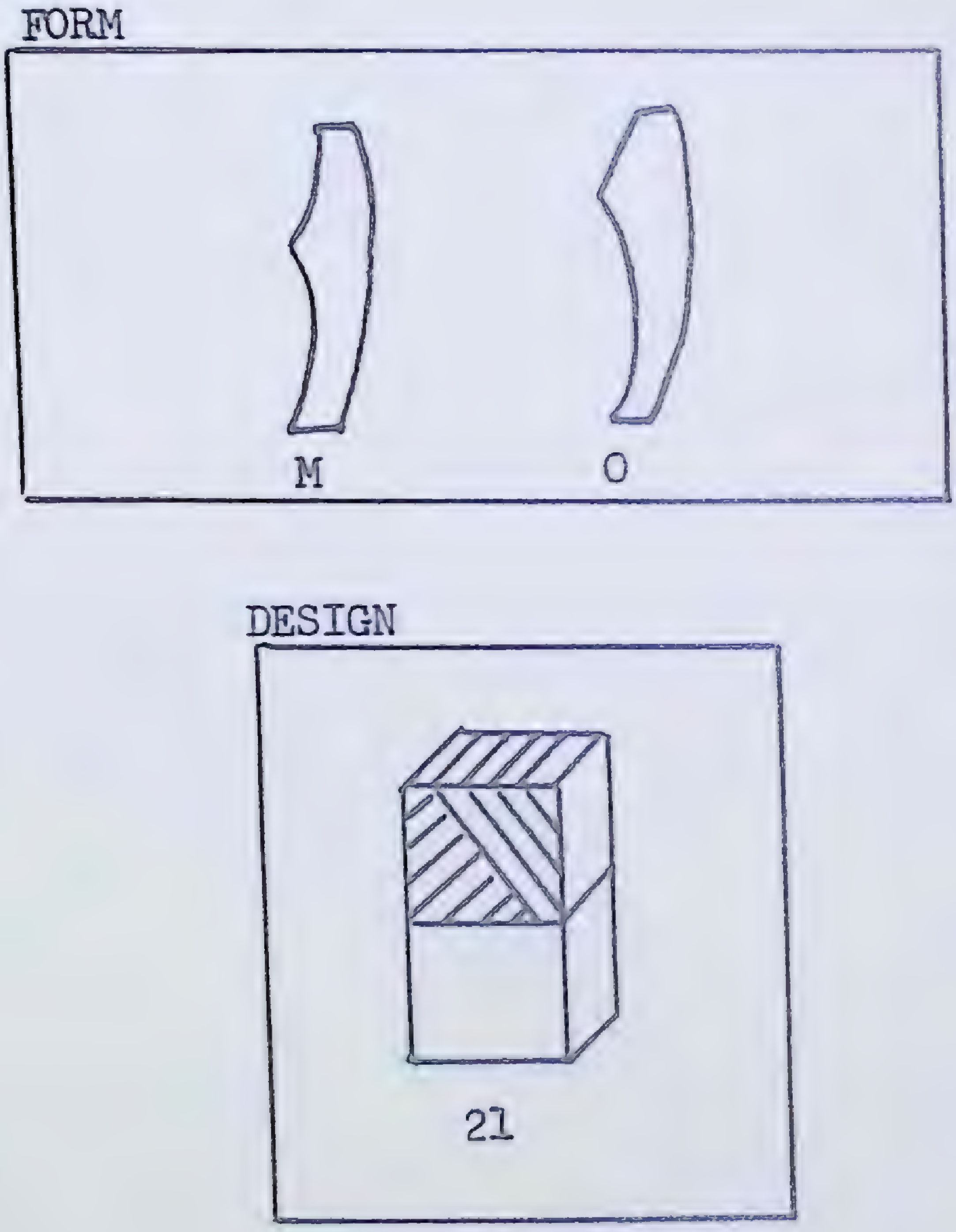


FIGURE 35a—*Sidey Notched*

		FORM		
		M	O	
DESIGN	21	1	1	2
		1	1	2

FIGURE 35b—*Form-design relationships*

k) Warminster Crossed and Warminster Horizontal

1.17% 3 sherds .39% 1 sherd

Three rim sherds of Warminster Crossed (11, p. 32) (M42, O41, and O43) and one sherd of Warminster Horizontal (11, p. 34) (O44) were excavated. These types achieve popularity at the stage of historic Huron and may just be developing at this point in time.

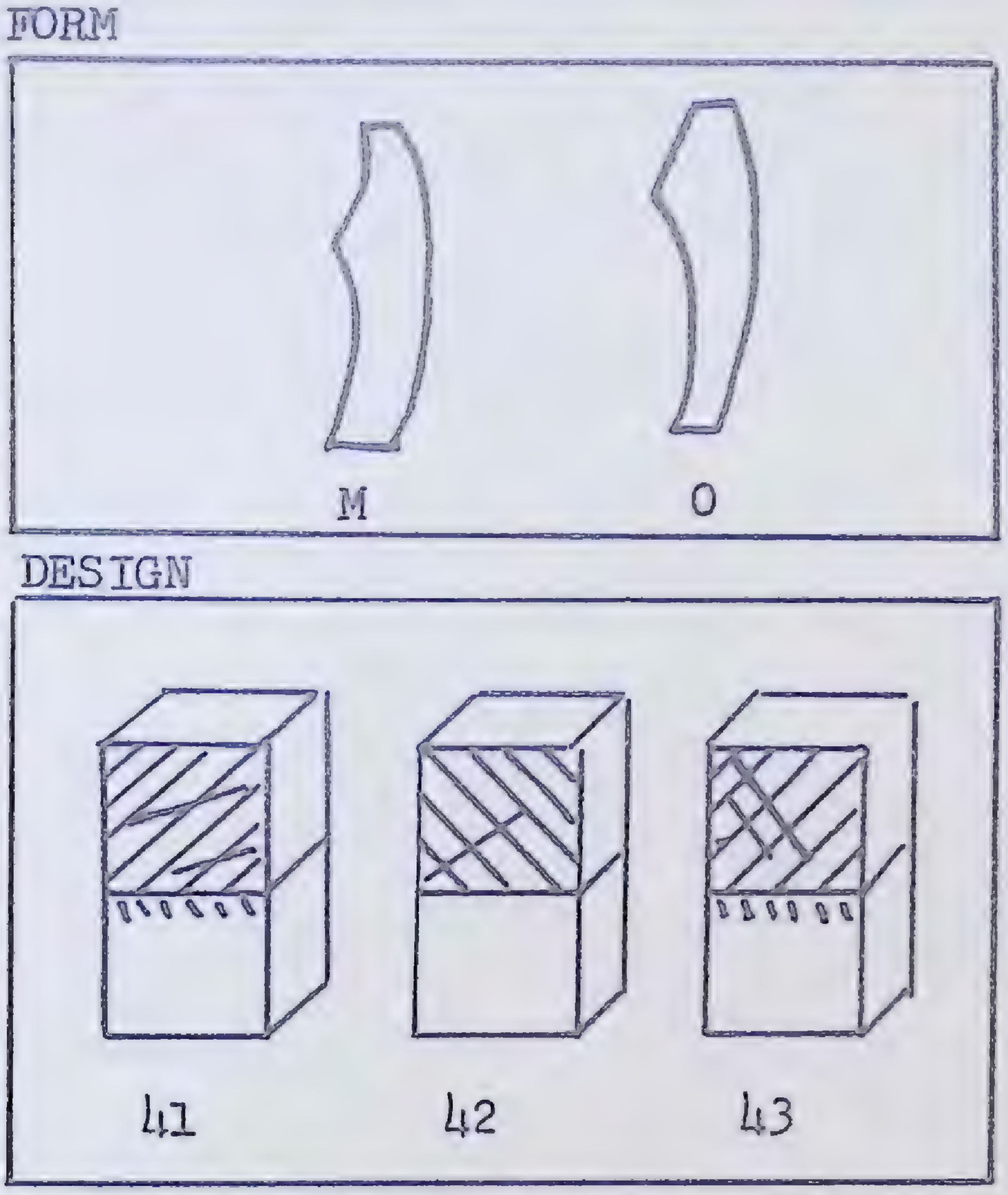


FIGURE 36a—*Warminster Crossed*

	FORM		
DESIGN	M	O	
41		1	1
42	1		1
43		1	1
	1	2	3

FIGURE 36b—*Form-design relationships*

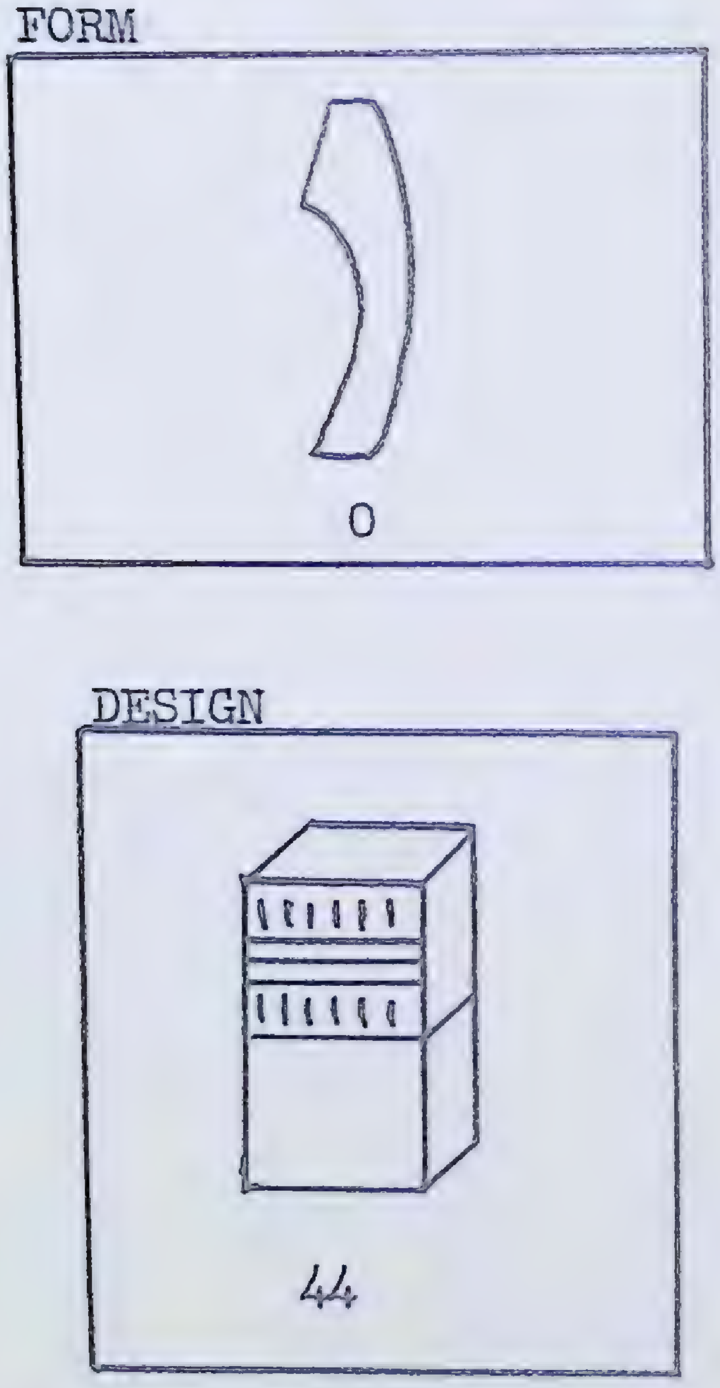


FIGURE 37a—*Warminster Horizontal*

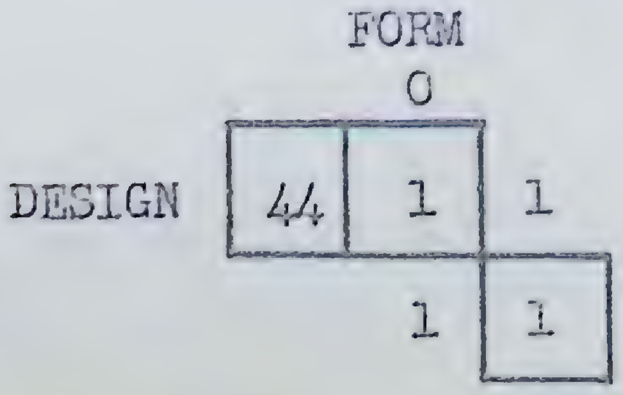


FIGURE 37b—*Form-design relationships*

l) Durfee Underlined

1.9% 5 sherds

Five rim sherds of Durfee Underlined were found. This was a relatively popular Onondaga Iroquois ceramic type at Roebuck (15). Considering the relative closeness of Roebuck, it is perhaps surprising that there was not a greater popularity of Onondaga types. However, a considerable time gap may be involved. Payne's orientation seems to have been westward rather than eastward. These five sherds of Durfee Underlined conform both in design and form to MacNeish's definition (11, p. 60).

Durfee Underlined includes rim sherds F52, F53, H51, H54, and H55 in the master rim sherd chart.

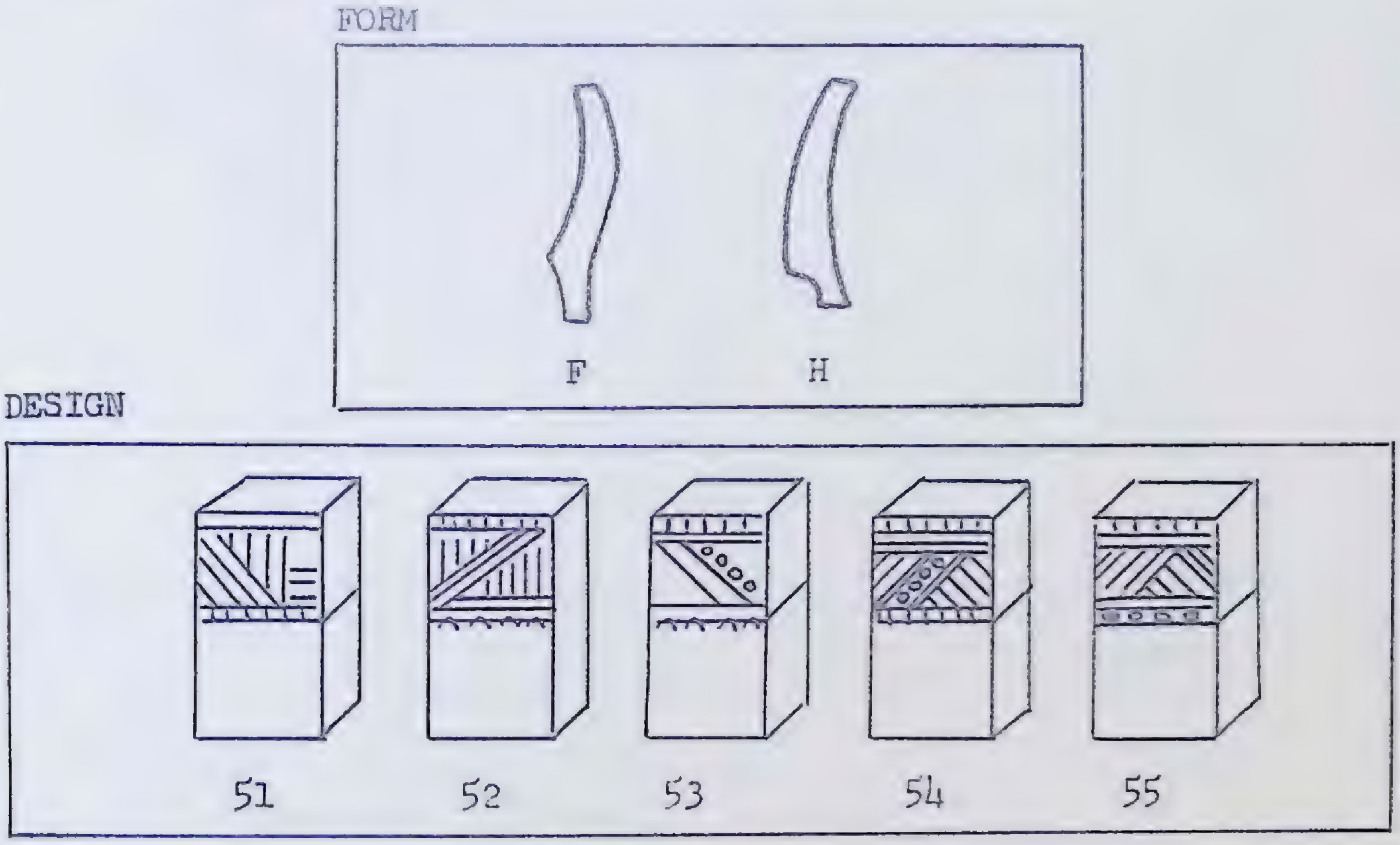


FIGURE 38a—*Durfee Underlined*

	FORM		
DESIGN	F	H	
51		1	1
52	1		1
53	1		1
54		1	1
55		1	1
	2	3	5

FIGURE 38b—*Form-design relationships*

m) Onondaga Triangular

.78% 2 sherds

This is a type also encountered at Roebuck (6%), and one which was very popular in Eastern New York State (11, p. 60). Again, considering the proximity of Roebuck, its occurrence at Payne was surprisingly low, for only two rim sherds were found (G39 and P40). Here again, however, a time gap may be involved as regards Roebuck.

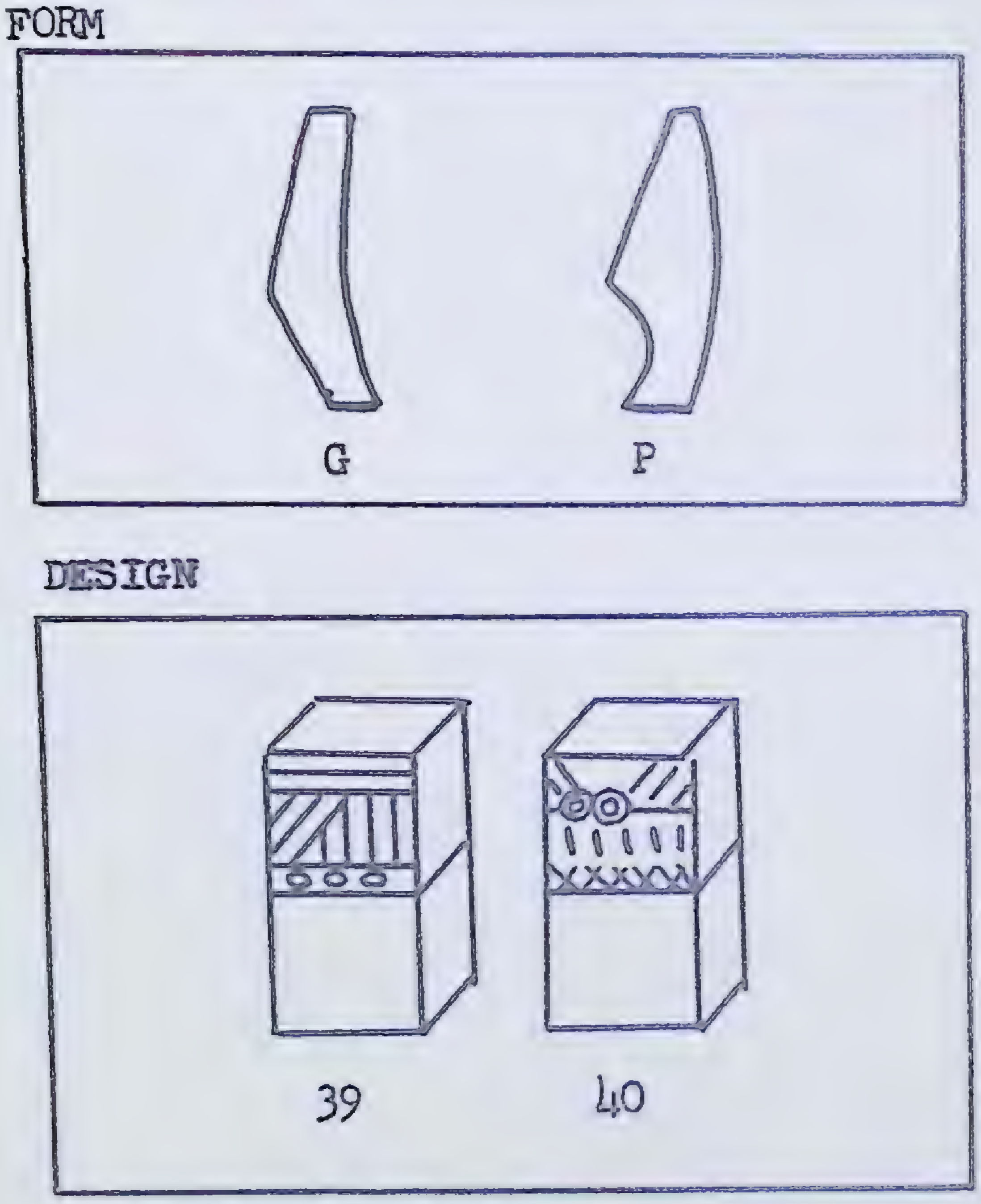


Figure 39a—*Onondaga Triangular*

		FORM		
		G	P	
DESIGN	39	1		1
	40		1	1
		1	1	2

Figure 39b—*Form-design relationships*

n) Dutch Hollow Notched

4.6% 12 sherds

This very distinctive ceramic type was quite popular on Seneca sites in Western New York State (11, p. 43) (Factory Hollow 40%, Adams 38%, Dutch Hollow 27%). This again seems to stress the westward orientation of Payne. This type features a decorative notching technique on an uncollared, expanded lip rim form. Twelve of these rims were recovered.

Dutch Hollow Notched includes the rim sherds in I58 of the master rim sherd charts.

o) Richmond Incised

.39% 1 sherd

A single rim sherd of Richmond Incised (11, p. 51) was found (H69). This was a very popular Cayuga ceramic type (Richmond Mills 72%). A single case, however distinctive, is sparse evidence, but it again suggests a western orientation for the Payne site.

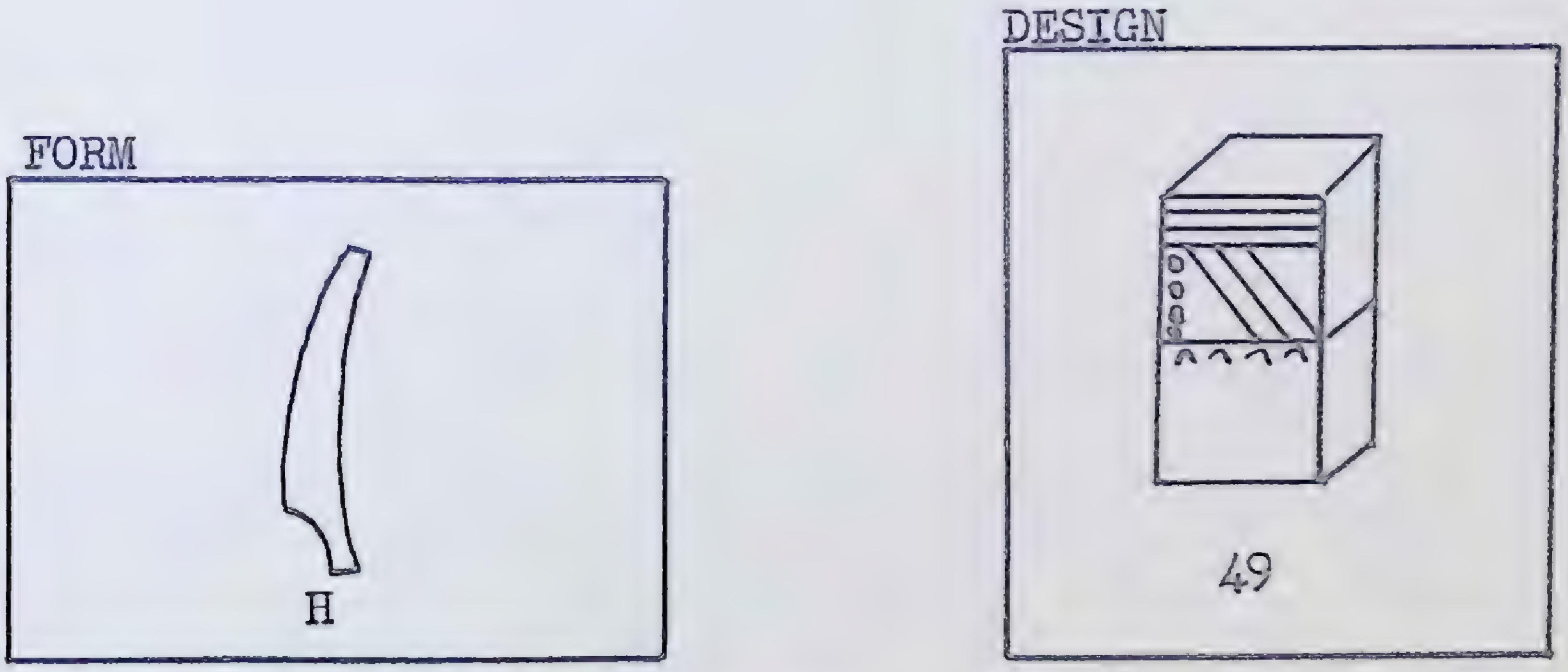


Figure 40a—
Richmond Incised

		FORM H	
DESIGN	49	1	
		1	1

Figure 40b—*Form-design relationships*

p) Iroquois Linear

.39% 1 sherd

Only one rim sherd of this type was found. It featured the 'push-pull' design technique so typical of this ceramic type. This is quite popular at the Uren site (11, p. 18) (15%). It is a clear-cut early period time marker. Its presence at the Payne site is somewhat baffling. It appears in cell C59 on the master charts.

q) Aberrant Sherds

Three rim sherds were encountered which defied classification into the known types. The first was a dark grey-black vertical uncollared rim having a decorative motif produced by check stamping and having in profile Form L (*see* c, Figure 41).

The second was a small orange-coloured rim sherd, Form O, decorated with two rows of punctates which resemble thumbnail impressions (*see* a, Figure 41).

The third was decorated with a double row of circular punctates and a haphazard series of lightly incised lines. Contour was Form A (*see* b, Figure 41).

It is inevitable in any process of pottery typing that a number of rim sherds will be unclassified. They may ultimately be recognized as pertaining to types at a future date. For this reason the above description is included.

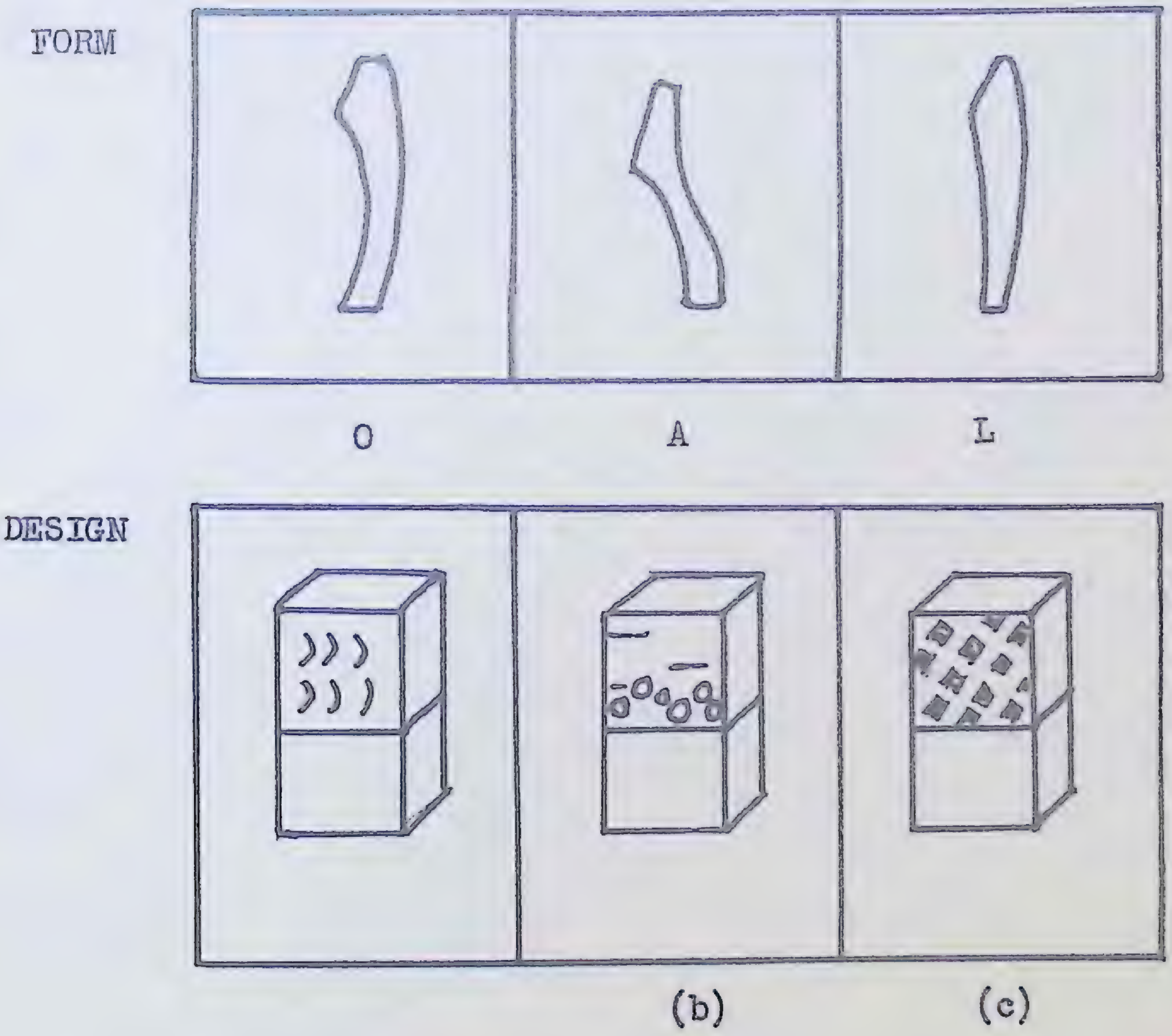


FIGURE 41 —*Aberrant sherds*

APPENDIX B

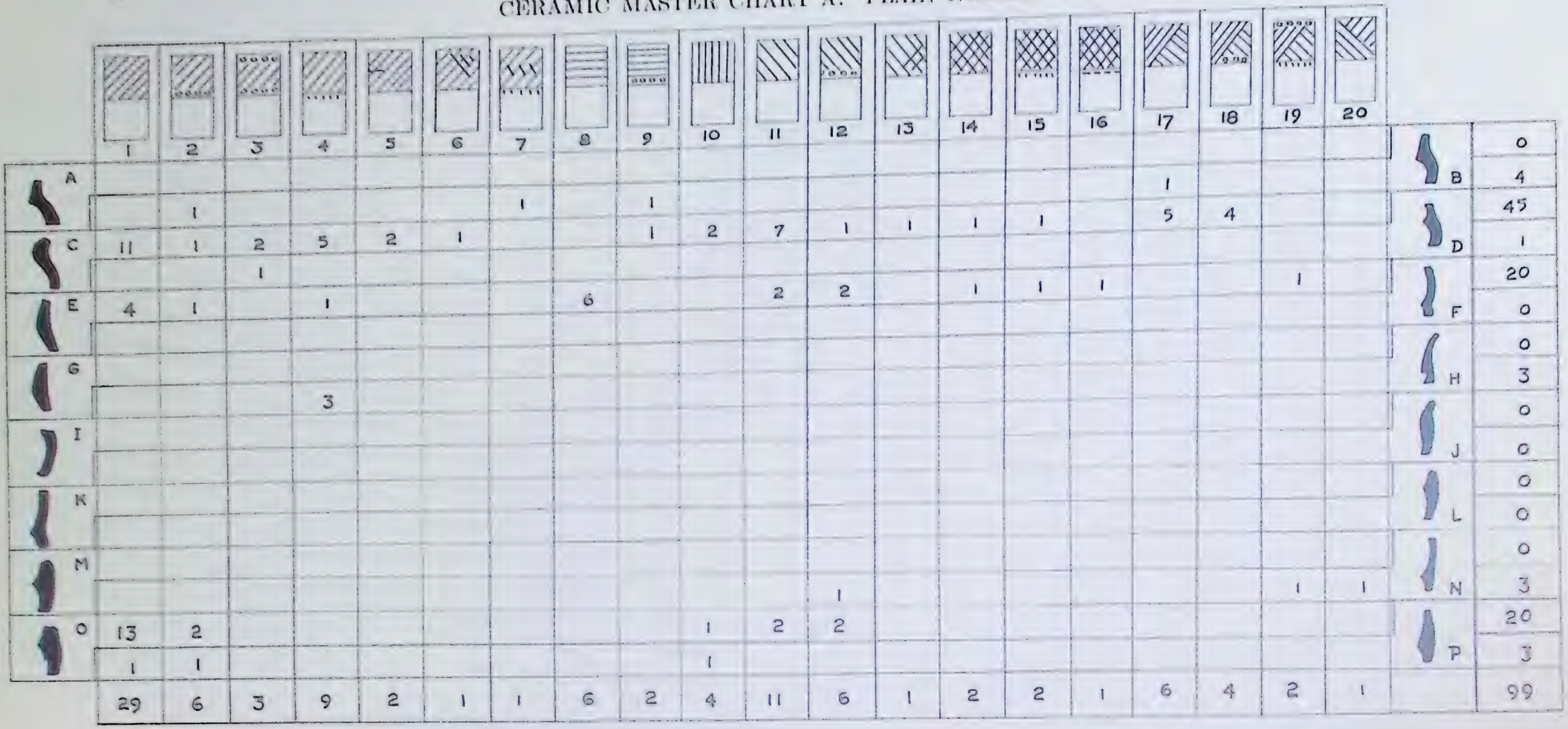
CERAMIC MASTER CHARTS

Introduction

The following five charts are presented for the research worker and represent diagrammatically the analysable rim sherds from the Payne site. The features of design and form are set on a grid system in such a way that any given square in the chart represents a given design-form combination. The horizontal axis of the chart represents design motifs; the vertical axis indicates the form variants.

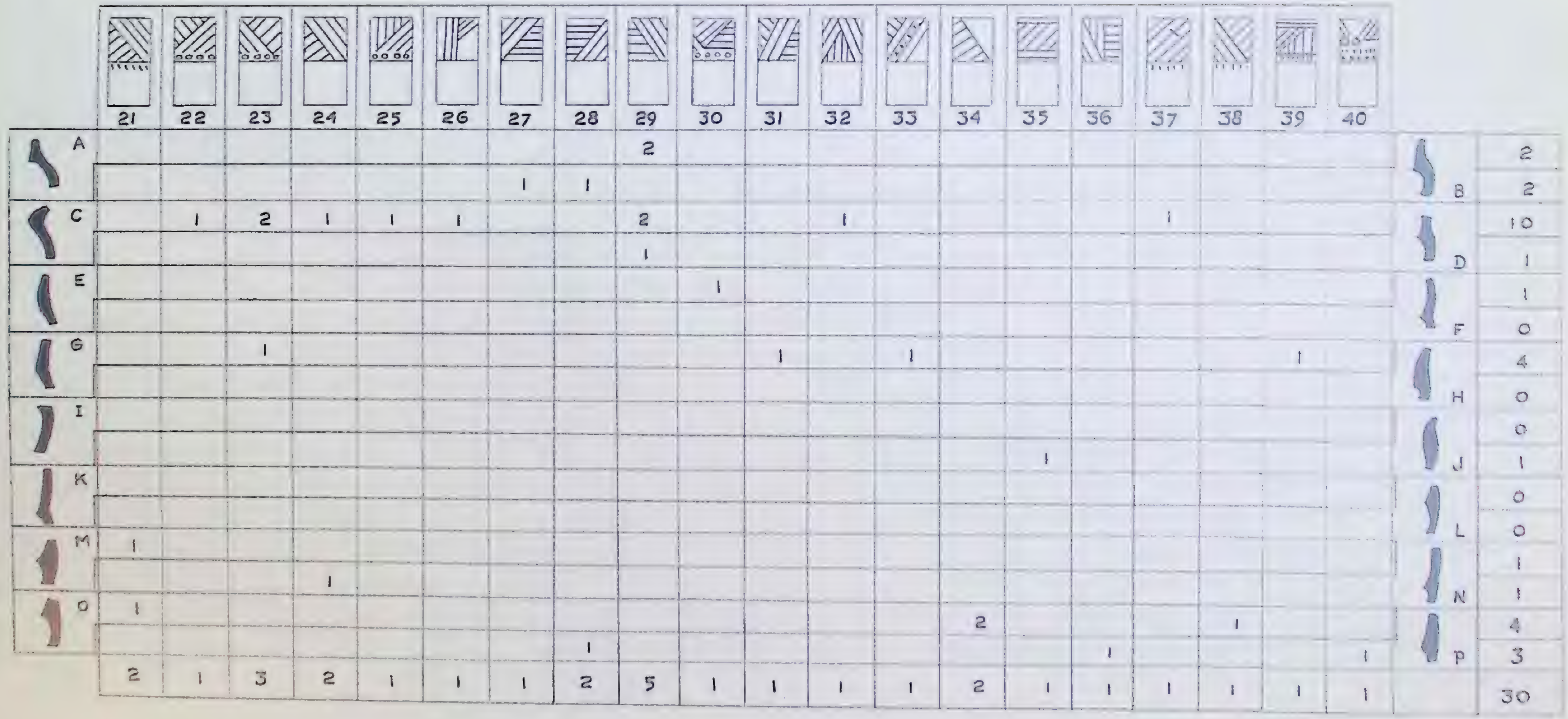
It is thus possible to abstract the ceramic types by inspection. The charts deal first with plain necked rim sherds and secondly with neck decorated rim sherds. This is a matter of convenience only. The same is true of the ordering of design motifs and form variants. The designs are presented roughly in an order from simple to complex, and the forms are shown from rims with concave interiors to ones with convex interiors. Such a prior ordering tends to simplify the ultimate problems of analysis.

CERAMIC MASTER CHART A: PLAIN NECKED SERIES, 1–20



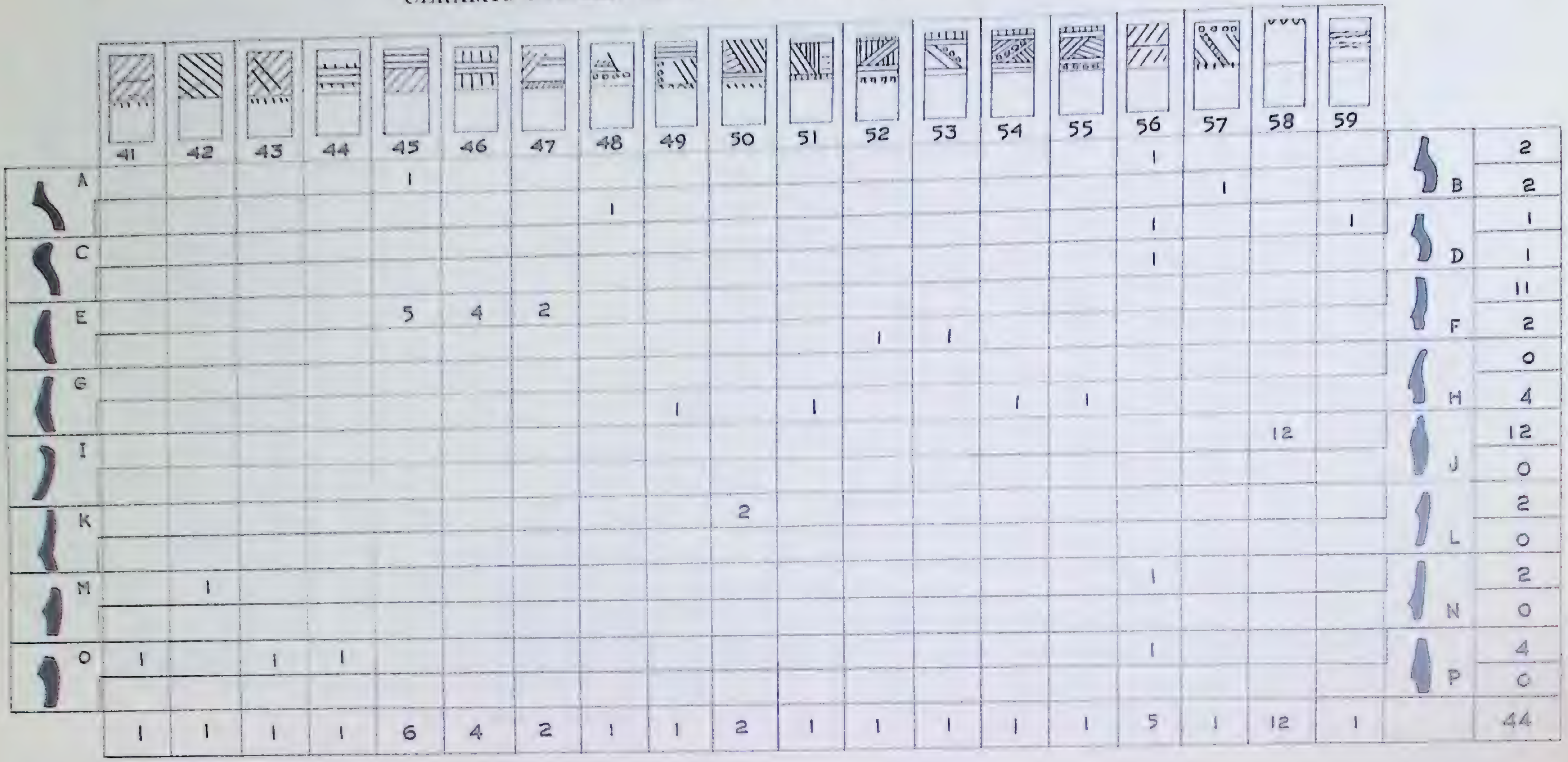
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A																					0
B		1					1		1								1				4
C	11	1	2	5	2	1			1	2	7	1	1	1	1		5	4			45
D			1																		1
E	4	1		1				6			2	2		1	1	1			1		20
F																					0
G																					0
H				3																	3
I																					0
J																					0
K																					0
L																					0
M																					0
N												1							1	1	3
O	13	2								1	2	2									20
P	1	1								1											3
	29	6	3	9	2	1	1	6	2	4	11	6	1	2	2	1	6	4	2	1	99

CERAMIC MASTER CHART B: PLAIN NECKED SERIES, 21–40



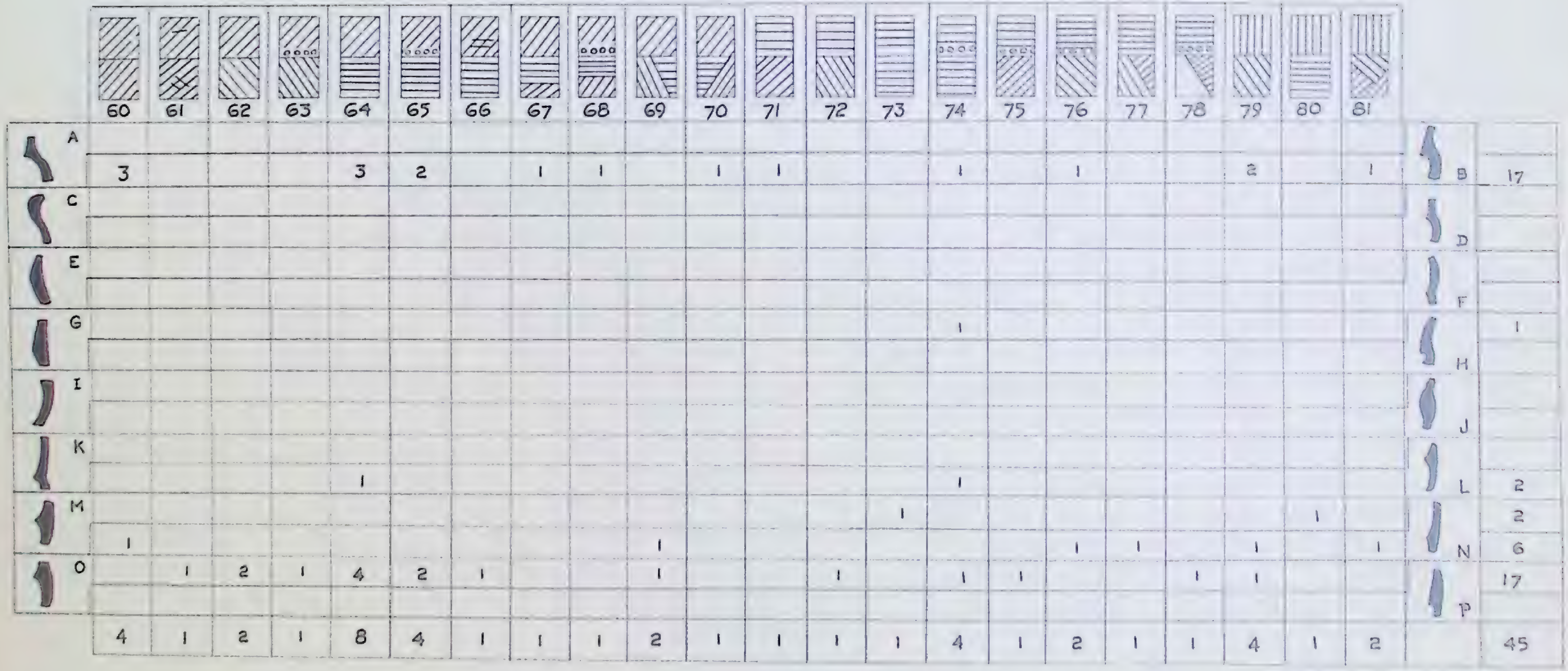
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
A									2												2
B							1	1													2
C		1	2	1	1	1			2			1					1				10
D									1												1
E										1											1
F																					0
G			1								1		1						1		4
H																					0
I																					0
J															1						1
K																					0
L																					0
M	1																				1
N				1																	1
O	1													2				1			4
P								1								1				1	3
	2	1	3	2	1	1	1	2	5	1	1	1	1	2	1	1	1	1	1	1	30

CERAMIC MASTER CHART C: PLAIN NECKED SERIES, 41–59



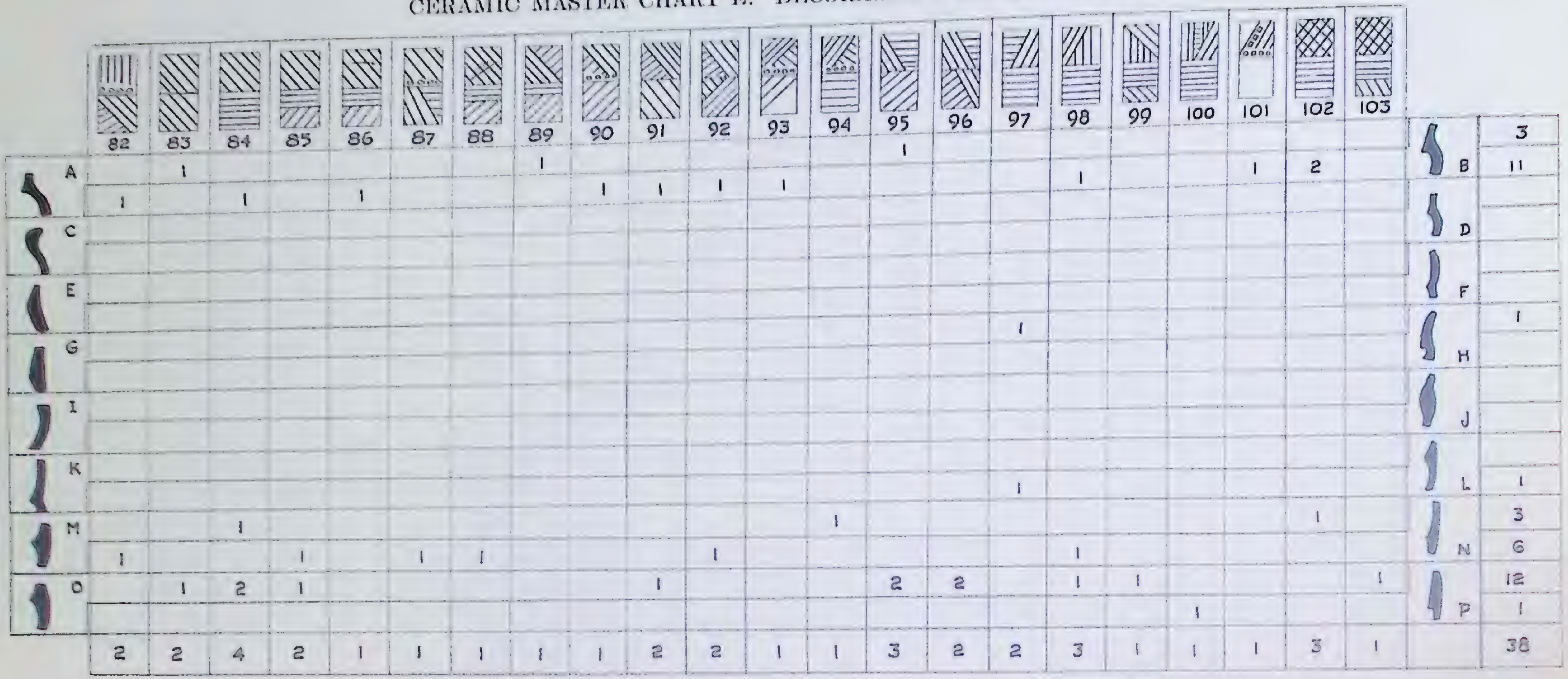
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59		
A					1											1				B	2
								1									1				2
C																1			1	D	1
																1					1
E					5	4	2													F	11
												1	1								2
G																				H	0
									1		1			1	1						4
I																		12		J	12
																					0
K										2										L	2
																					0
M		1														1				N	2
																					0
O	1		1	1												1				P	4
																					0
	1	1	1	1	6	4	2	1	1	2	1	1	1	1	1	5	1	12	1		44

CERAMIC MASTER CHART D: DECORATED NECK SERIES, 60–81



	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	
A																							
B	3				3	2		1	1		1	1			1		1			2		1	17
C																							
D																							
E																							
F																							
G															1								1
H																							
I																							
J																							
K																							
L					1										1								2
M														1							1		2
N	1									1							1	1		1		1	6
O		1	2	1	4	2	1			1			1		1	1			1	1			17
P																							
	4	1	2	1	8	4	1	1	1	2	1	1	1	1	4	1	2	1	1	4	1	2	45

CERAMIC MASTER CHART E: DECORATED NECK SERIES, 82–103



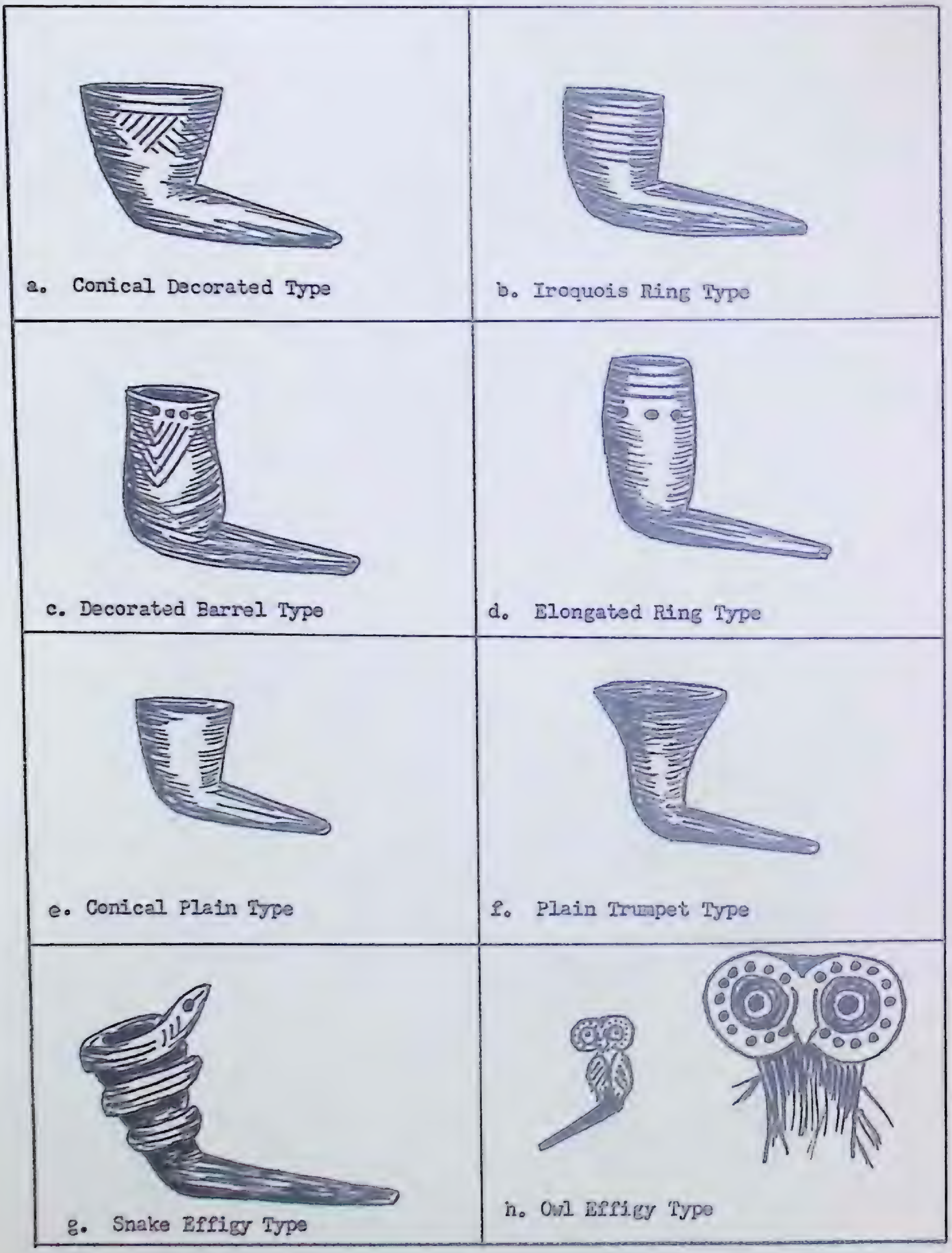
	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	
A		1						1						1									3
B	1		1		1				1	1	1	1					1			1	2		11
C																							
D																							
E																							
F																							
G																1							1
H																							
I																							
J																							
K																							
L																1							1
M			1										1								1		3
N	1			1		1	1				1						1						6
O		1	2	1						1				2	2		1	1				1	12
P																			1				1
	2	2	4	2	1	1	1	1	1	2	2	1	1	3	2	2	3	1	1	1	3	1	38

APPENDIX C

CERAMIC PIPE TYPES

Introduction

The following illustrations of ceramic pipe types are simply included for the reader's convenience. I have presented them essentially in their historical order and have based them on my broad and comprehensive survey. No attempt is made to defend the typology offered, but it is hoped that it will reduce the confusion of the student who is confronted with a welter of pipe-type names and the inevitable descriptive jargon associated with it.



a. Conical Decorated Type

b. Iroquois Ring Type

c. Decorated Barrel Type

d. Elongated Ring Type

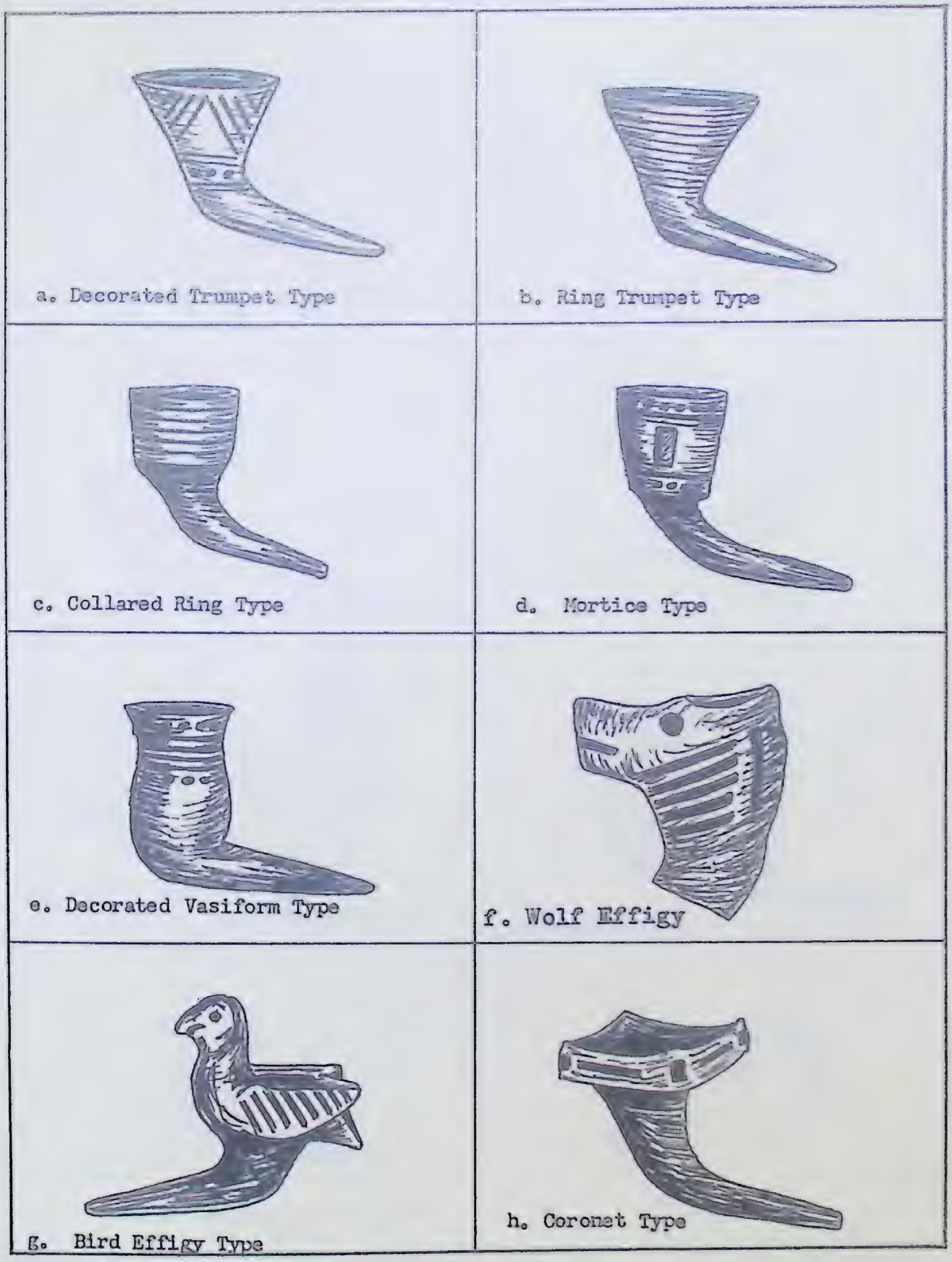
e. Conical Plain Type

f. Plain Trumpet Type

g. Snake Effigy Type

h. Owl Effigy Type

FIGURE 42 —*Iroquois pipe types*



a. Decorated Trumpet Type

b. Ring Trumpet Type

c. Collared Ring Type

d. Mortice Type

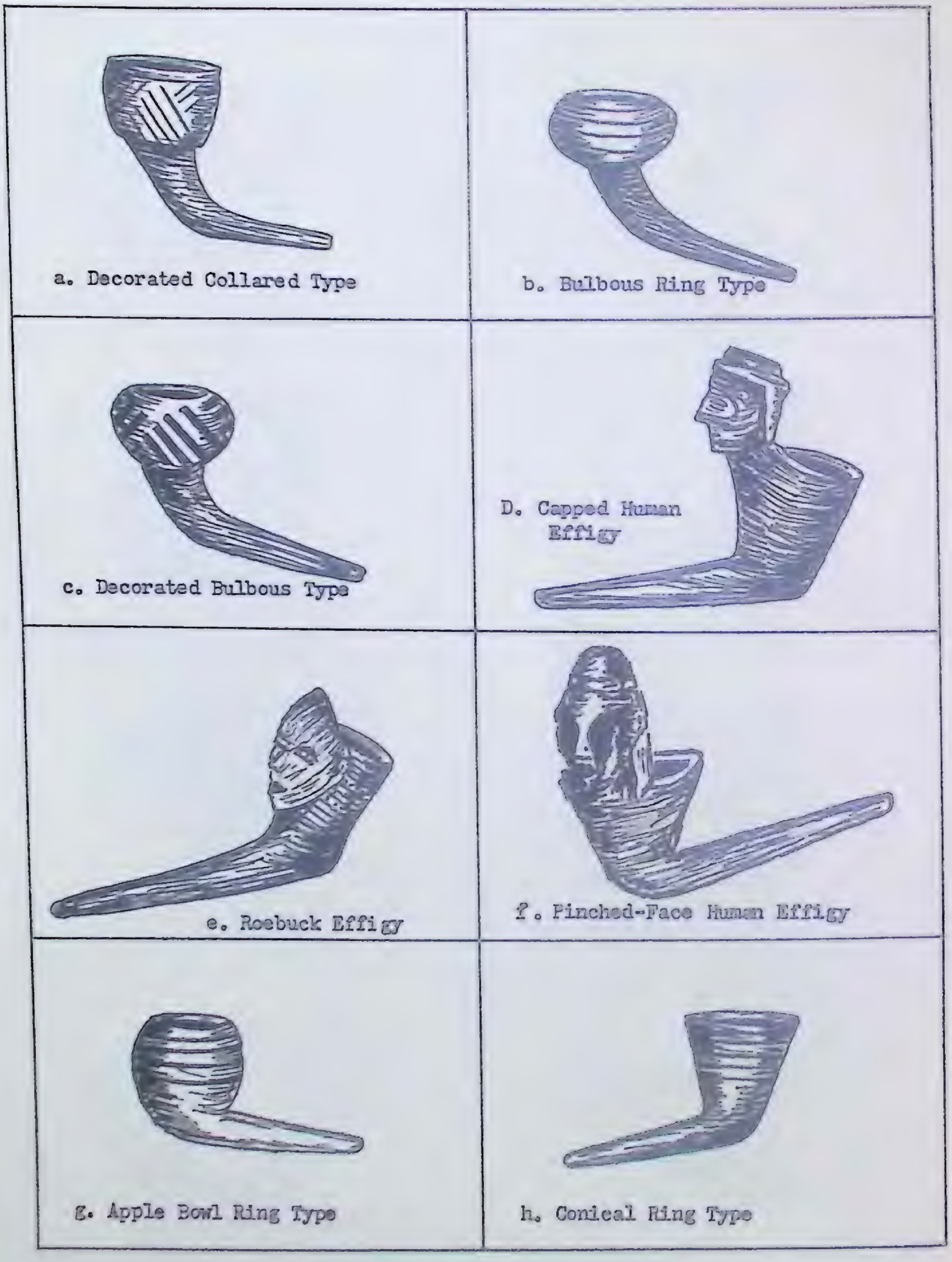
e. Decorated Vasiform Type

f. Wolf Effigy

g. Bird Effigy Type

h. Coronet Type

FIGURE 43 —*Iroquois pipe types* (Cont.)



a. Decorated Collared Type

b. Bulbous Ring Type

c. Decorated Bulbous Type

D. Capped Human Effigy

e. Roebuck Effigy

f. Pinched-Face Human Effigy

g. Apple Bowl Ring Type

h. Conical Ring Type

FIGURE 44.—*Iroquois pipe types* (Conc.)

APPENDIX D

CASTELLATION TYPES

INTRODUCTION

The following charts present in more or less temporal and historical order the castellation types I encountered upon the basis of a broad Ontario survey. Once again, there is no effort made to defend this typology. I hope to do this in future publications. However, it is hoped that this brief presentation will make the analysis of the Payne castellations more understandable.

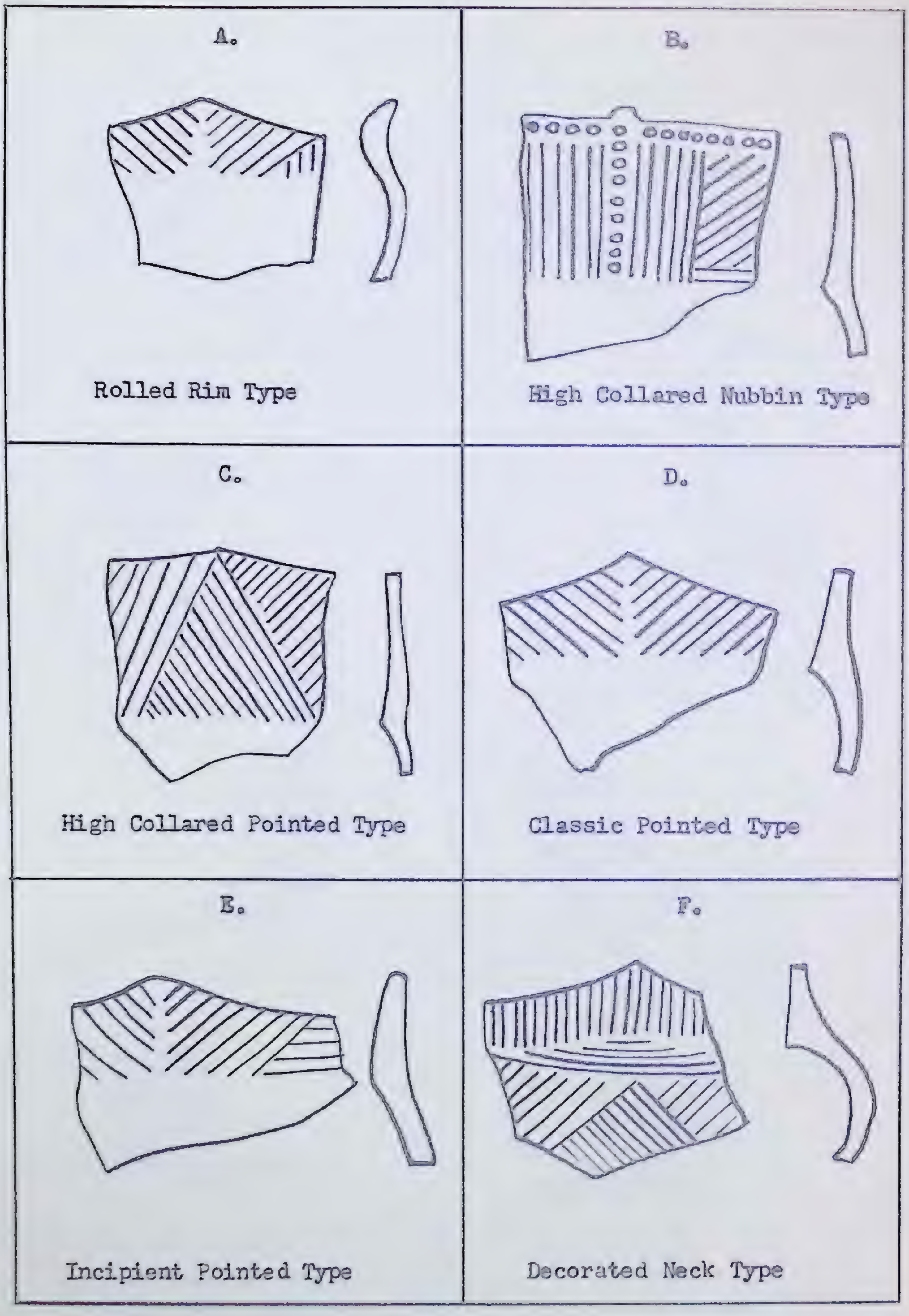


FIGURE 45.—*Early type castellations*

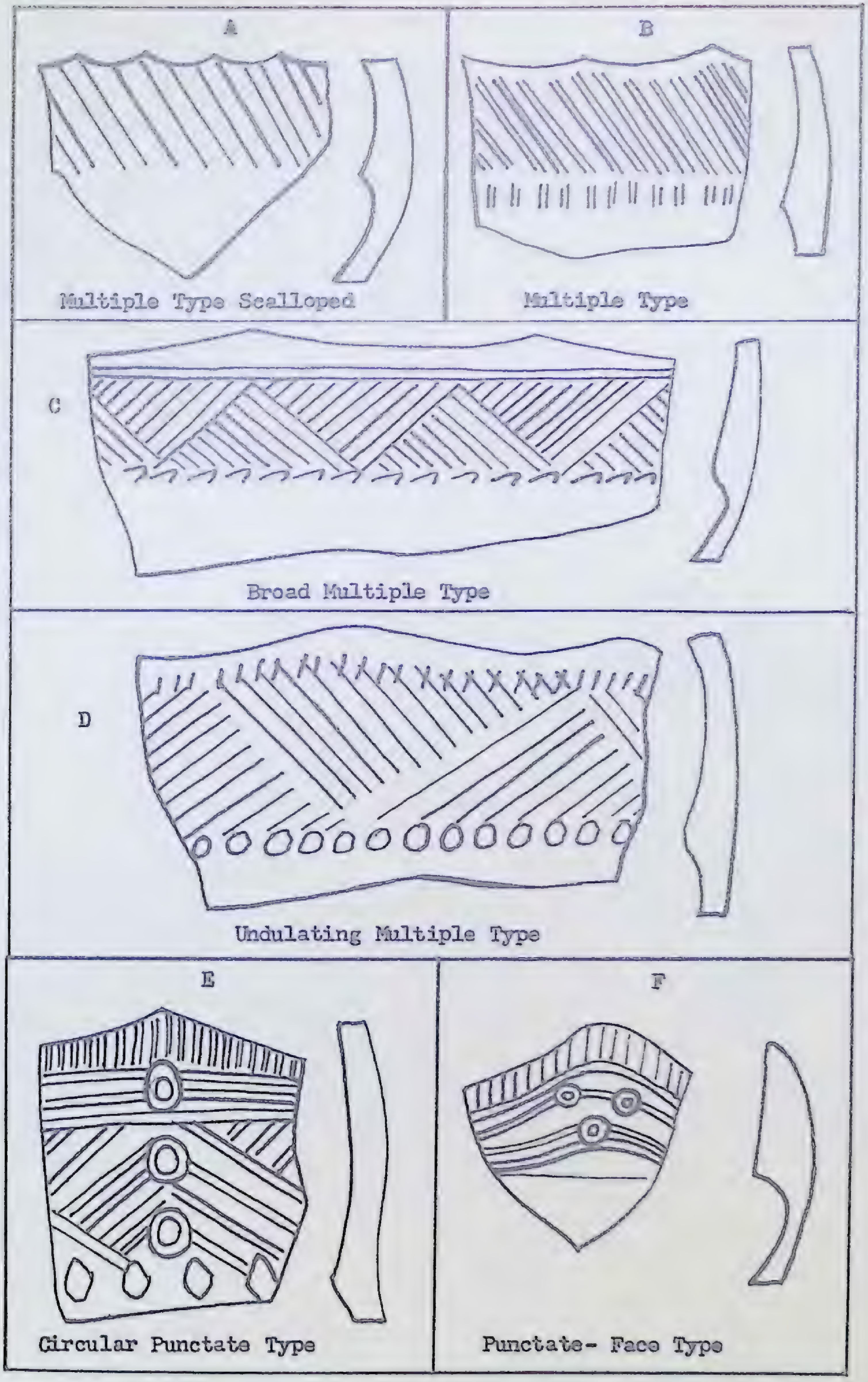


FIGURE 46 —*Middle Period castellations*

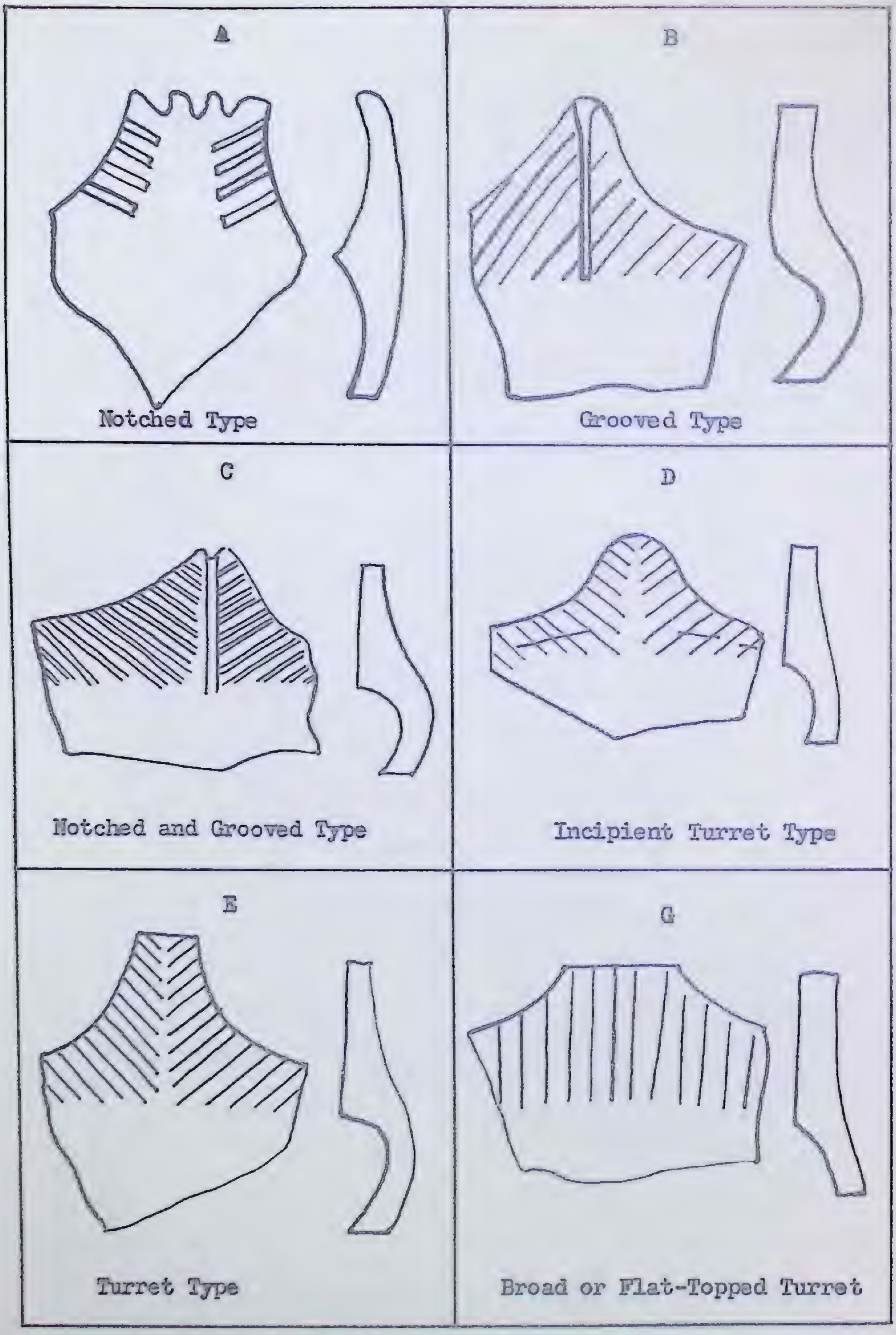


FIGURE 47.—*Late prehistoric and historic castellations*

PLATES I to XI

PLATE I

Fig.

1, 2. Perforated deer phalanges, cup-and-pin game type
3–10. Ground toggle type deer phalanges
11. Deer mandible corn cob scraper (?)

PLATE II

Fig.

1–13. Cut bird bone beads
14. Partially cut and drilled bone tube
15. Fragment of cut deer antler tine

PLATE I

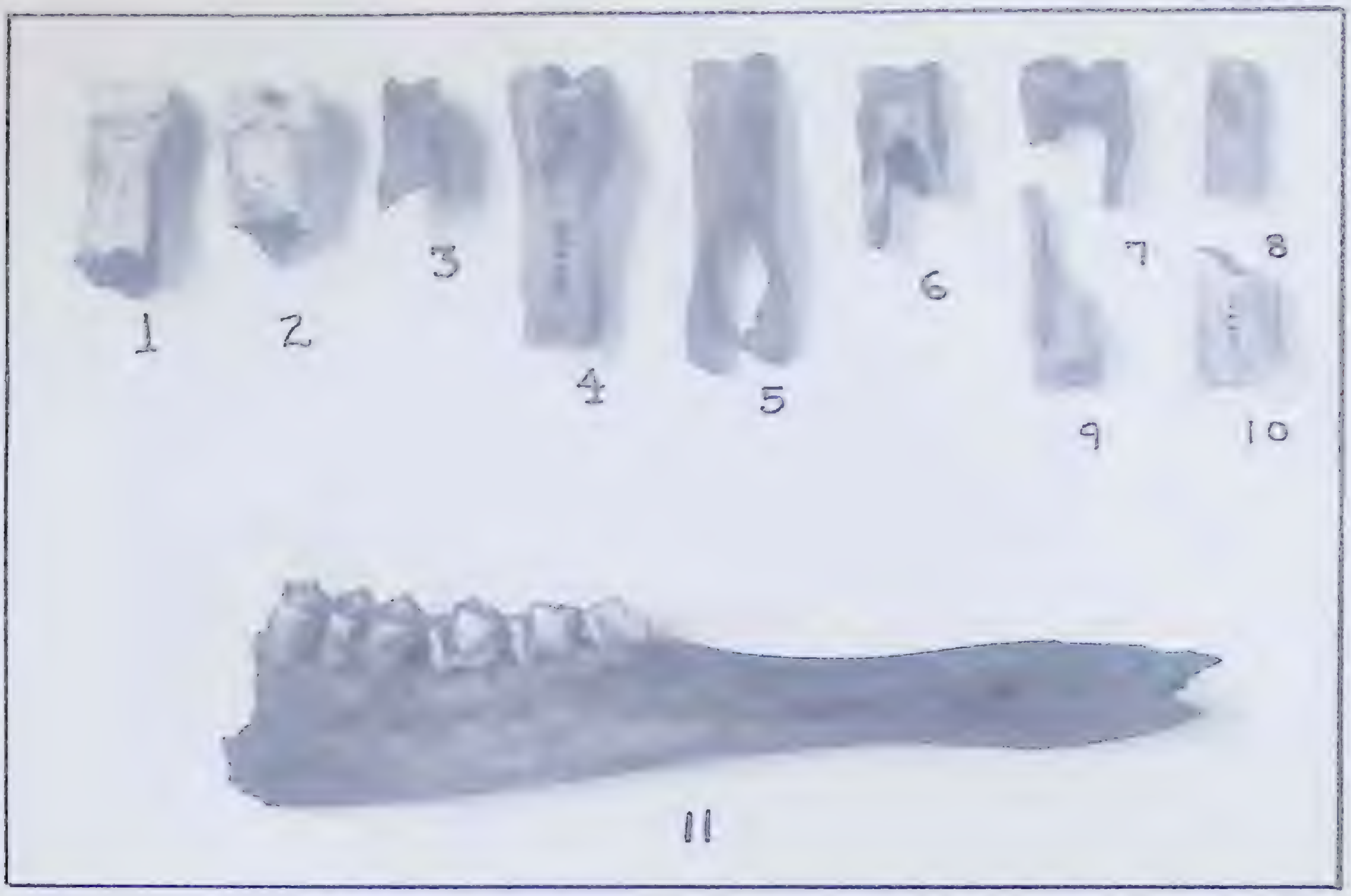


PLATE II

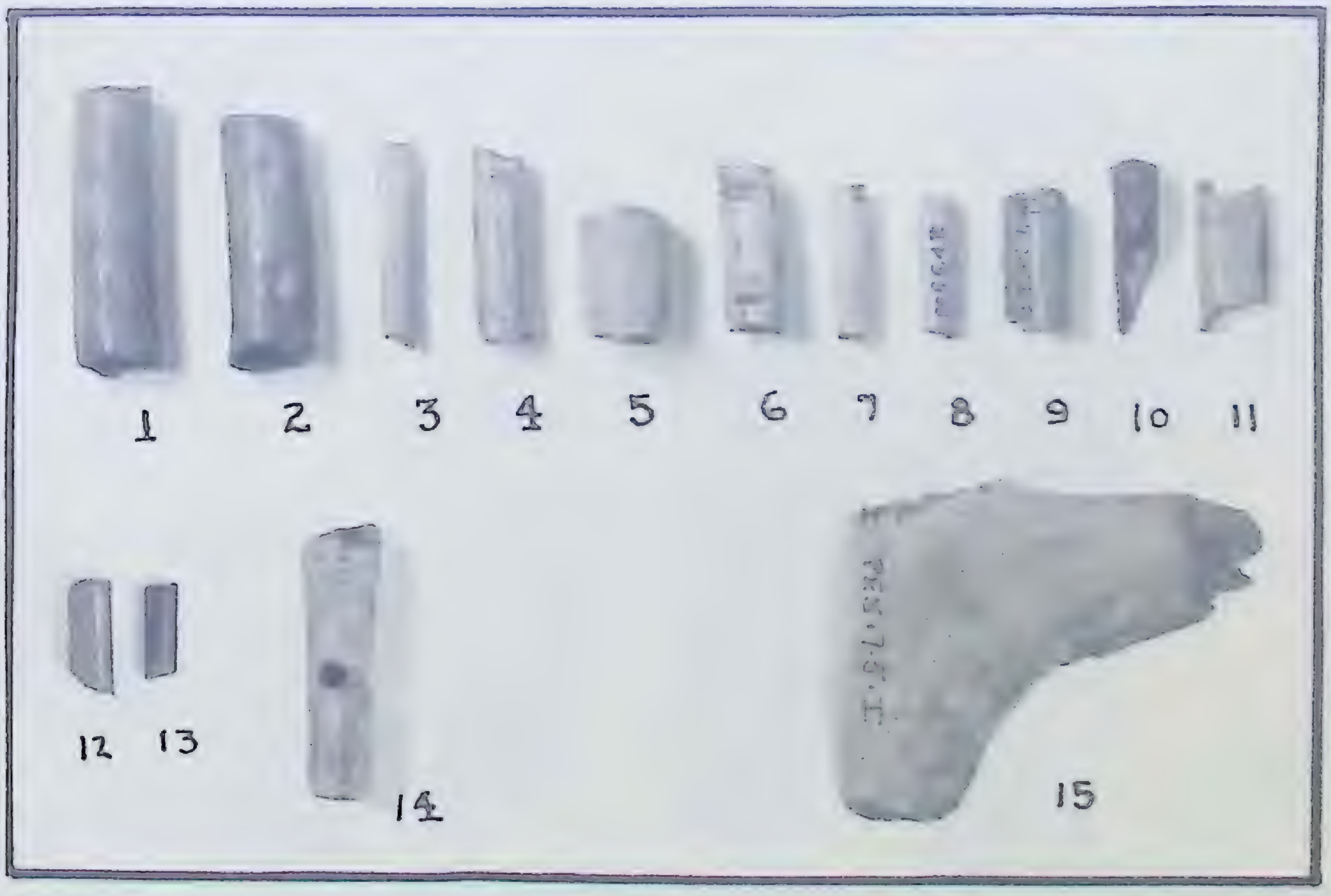


PLATE III

Fig.

1–5. Polished, splinter bone awls
6. Fragment of an incised bone tube
7. Cylindrical soapstone bead

PLATE IV

Fig.

1. Fragment of broken adze blade
2. Small adze blade
3. Plano-convex adze blade
4. Elongated trianguloid adze blade reworked for a chisel

PLATE III

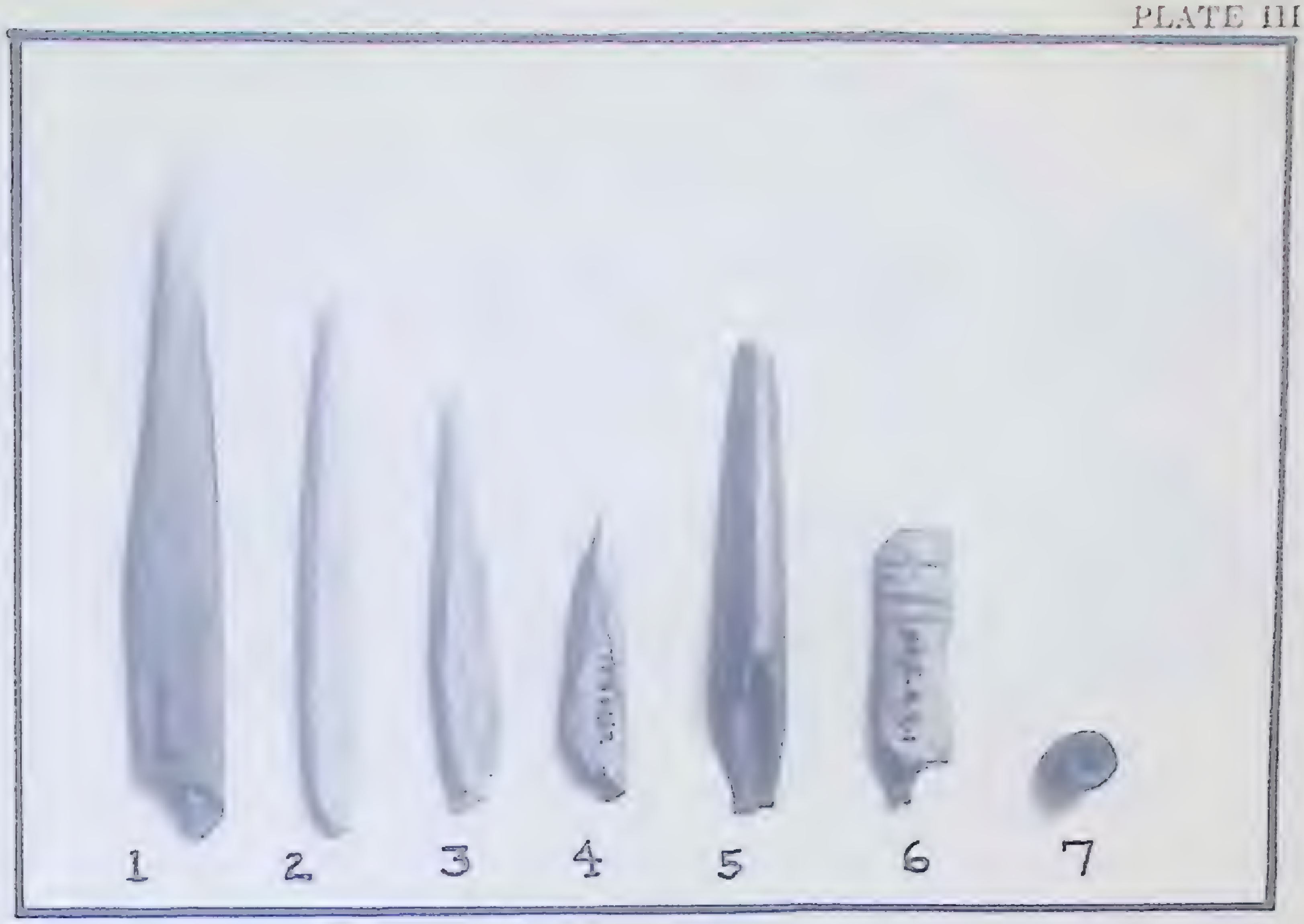


PLATE IV

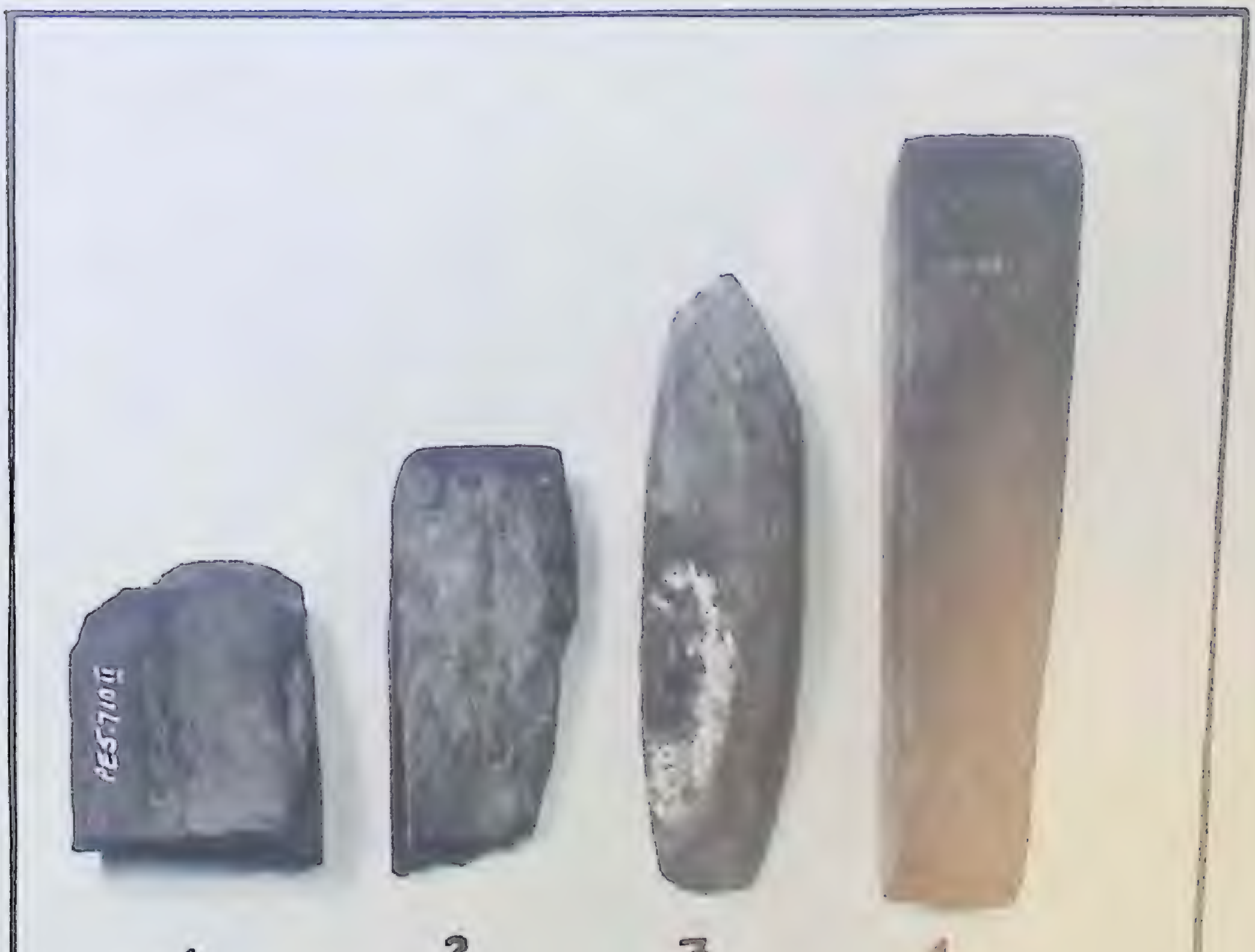


PLATE V

Fig.

1–8. Pottery gaming discs

PLATE VI

Fig.

1. Rim sherd, Huron Incised Type
2. Rim sherd, Huron Incised Type
3. Rim sherd, Lawson Opposed Type
4. Rim sherd, Black Necked Type
5. Rim sherd, Lawson Opposed Type
6. Rim sherd, Lawson Incised Type

PLATE V

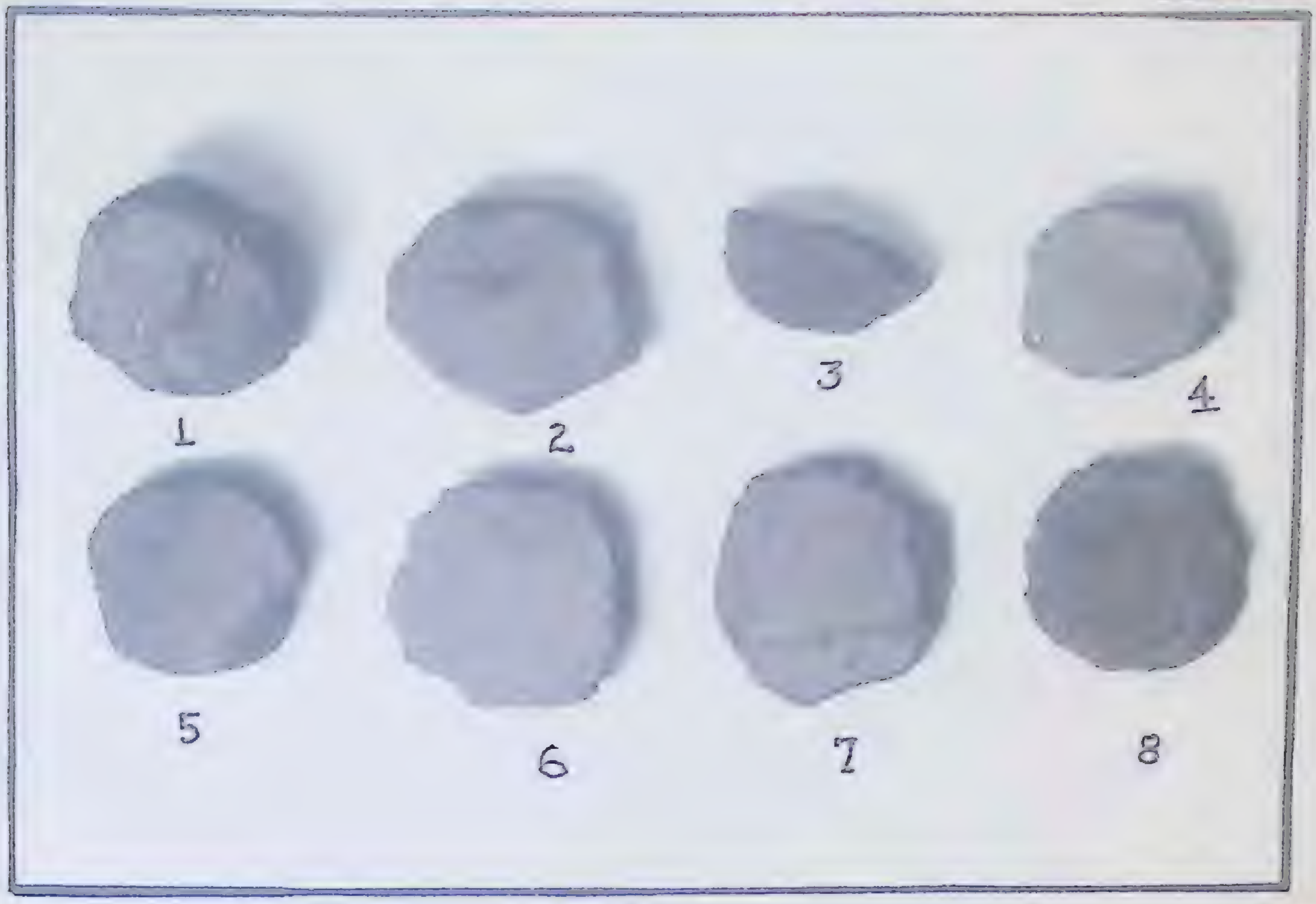


PLATE VI

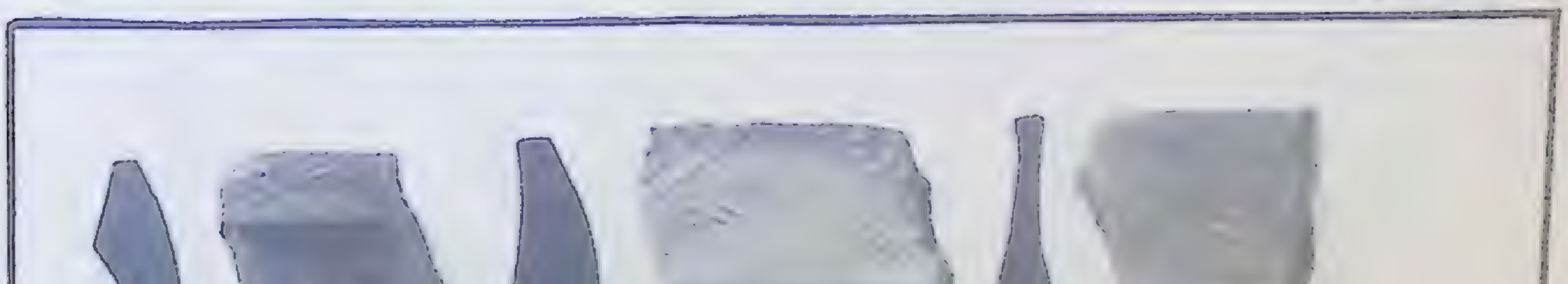


PLATE VII

Fig.
1. Rim sherd, Huron Incised Type
2. Rim sherd, variant of Lawson Opposed Type

PLATE VIII

Fig.
1. Rim sherd, Lawson Incised Type
2. Rim sherd, Lalonde High-Collared Type
3. Rim sherd, Warminster Horizontal Type
4. Rim sherd, Huron Incised Type
5. Rim sherd, Richmond Incised Type

PLATE VII

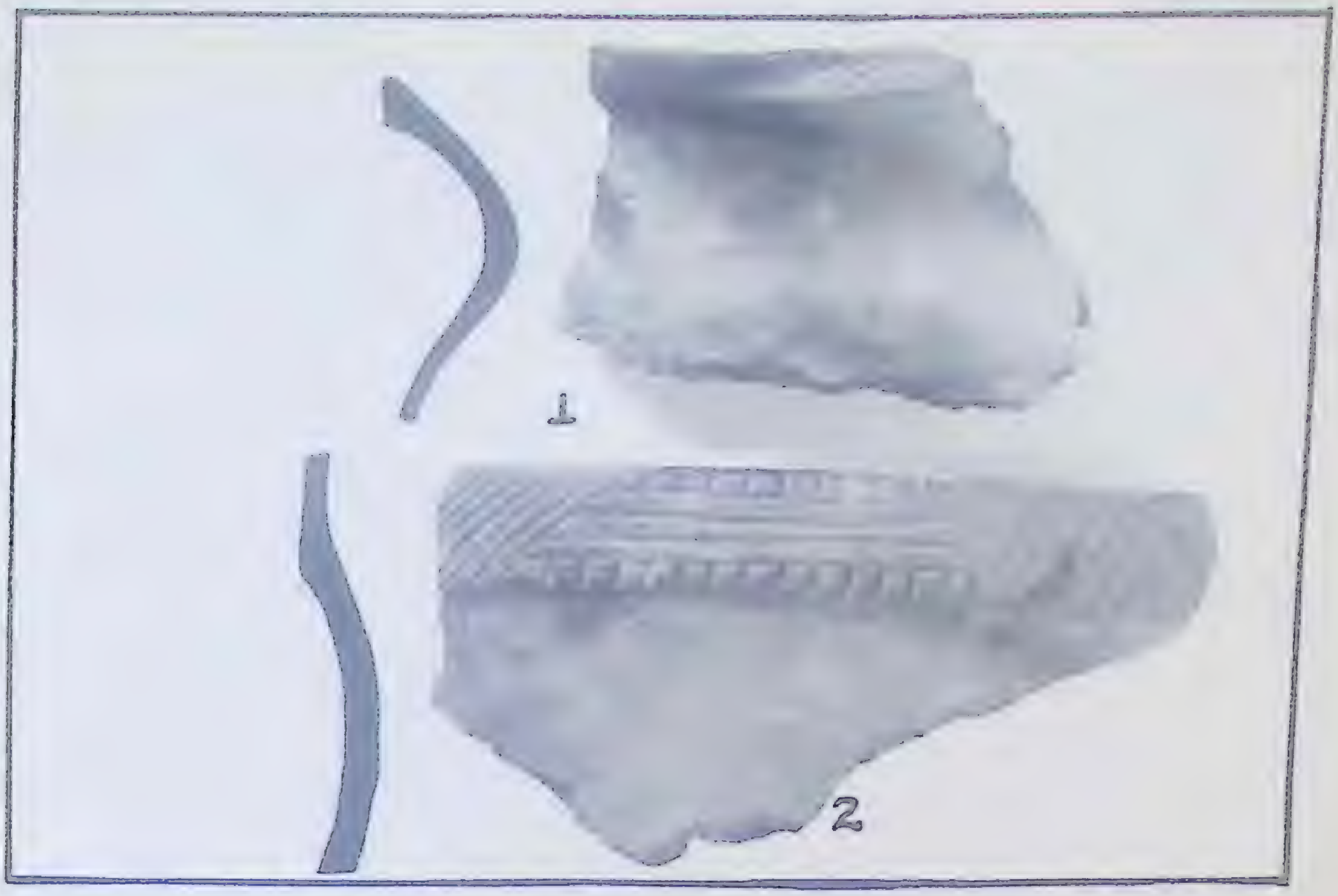


PLATE VIII

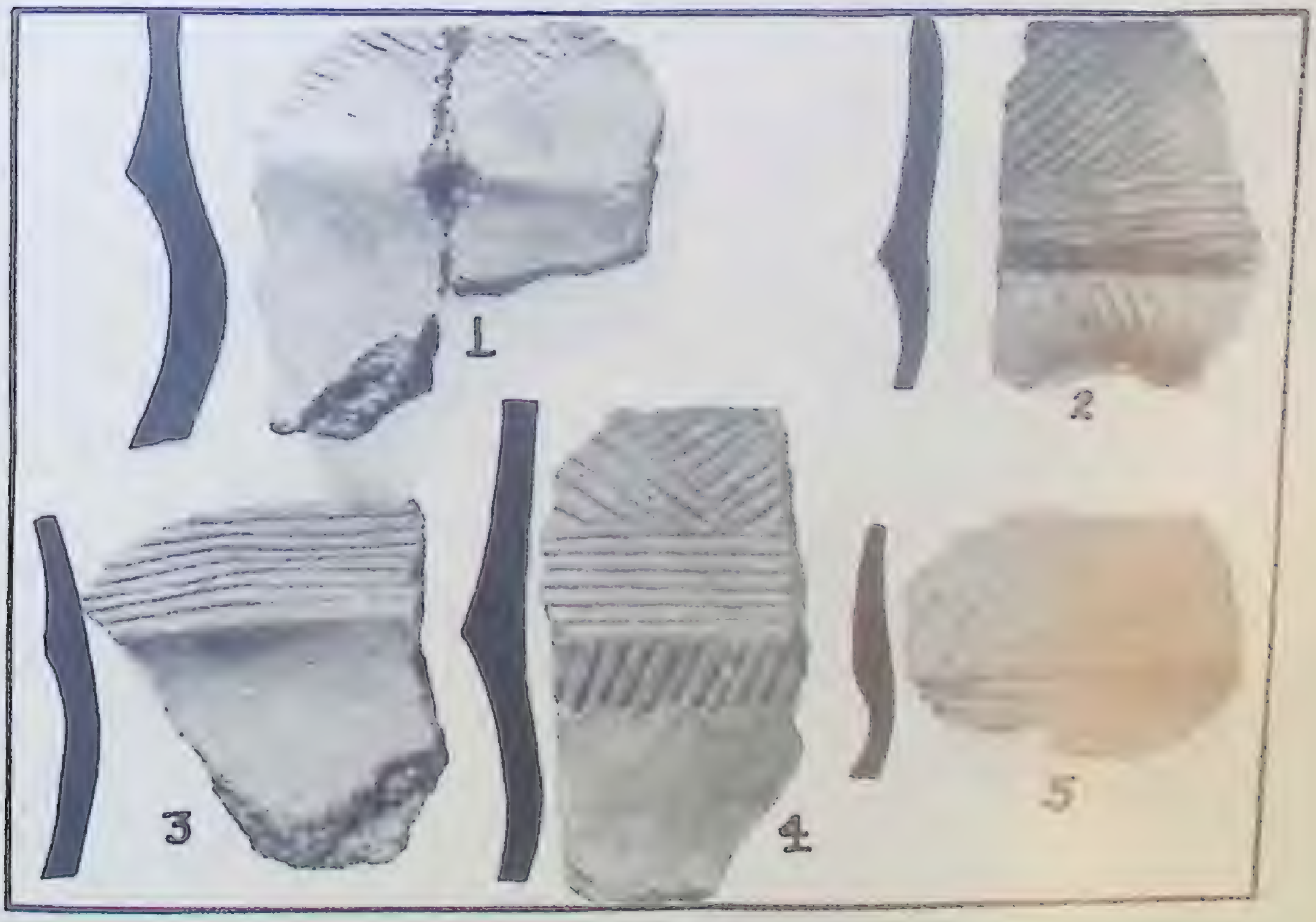


PLATE IX

Fig.

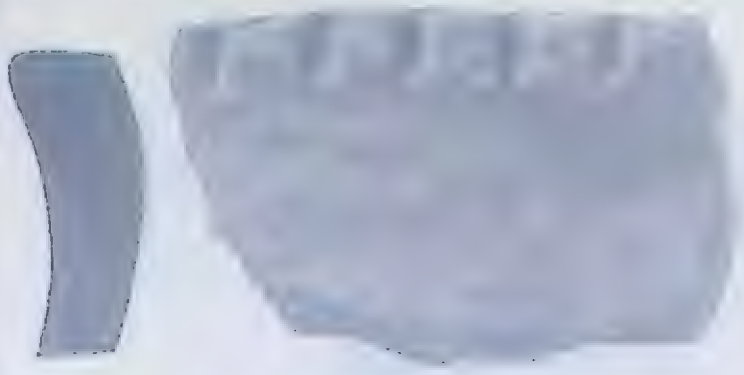
1. Rim sherd, Dutch Hollow Notched Type
2. Rim sherd, variant of Dutch Hollow Notched Type
3. Rim sherd, Seed Incised Type

PLATE X

Fig.

1. Castellation, Multiple Type
2. Castellation, High Collared Pointed Type
3. Castellation, Incipient Pointed Type
4. Castellation, Incipient Pointed Type
5. Castellation, Turret Type

PLATE IX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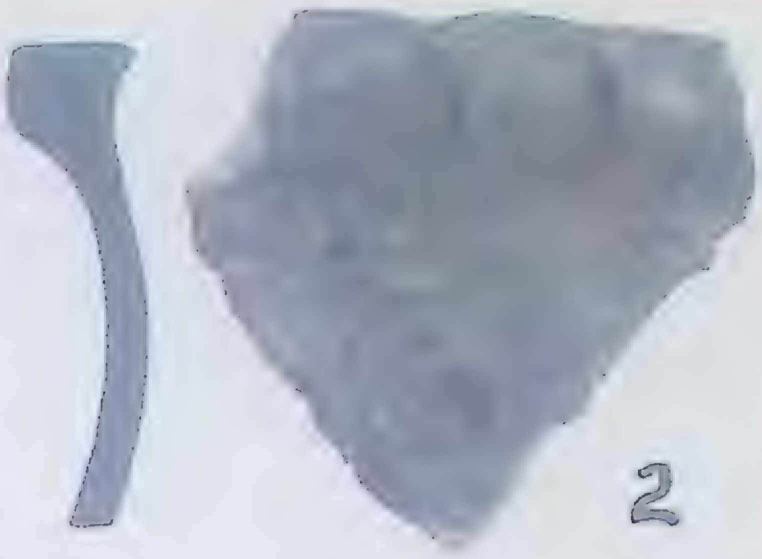
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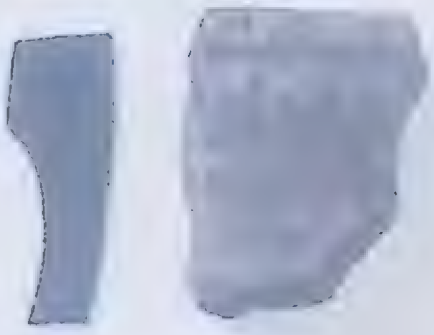
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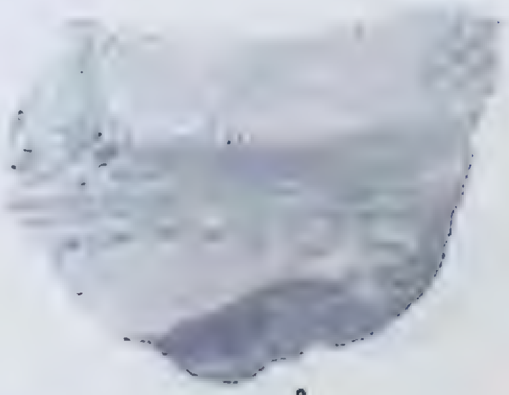
PLATE X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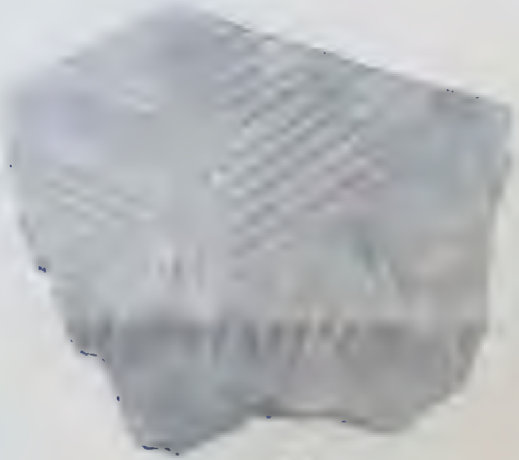
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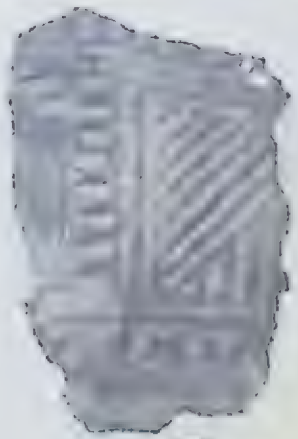
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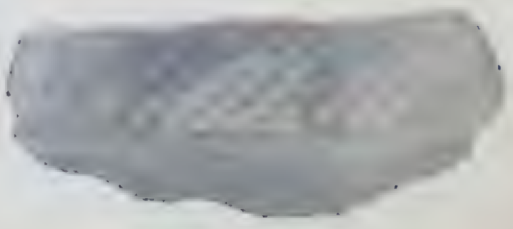
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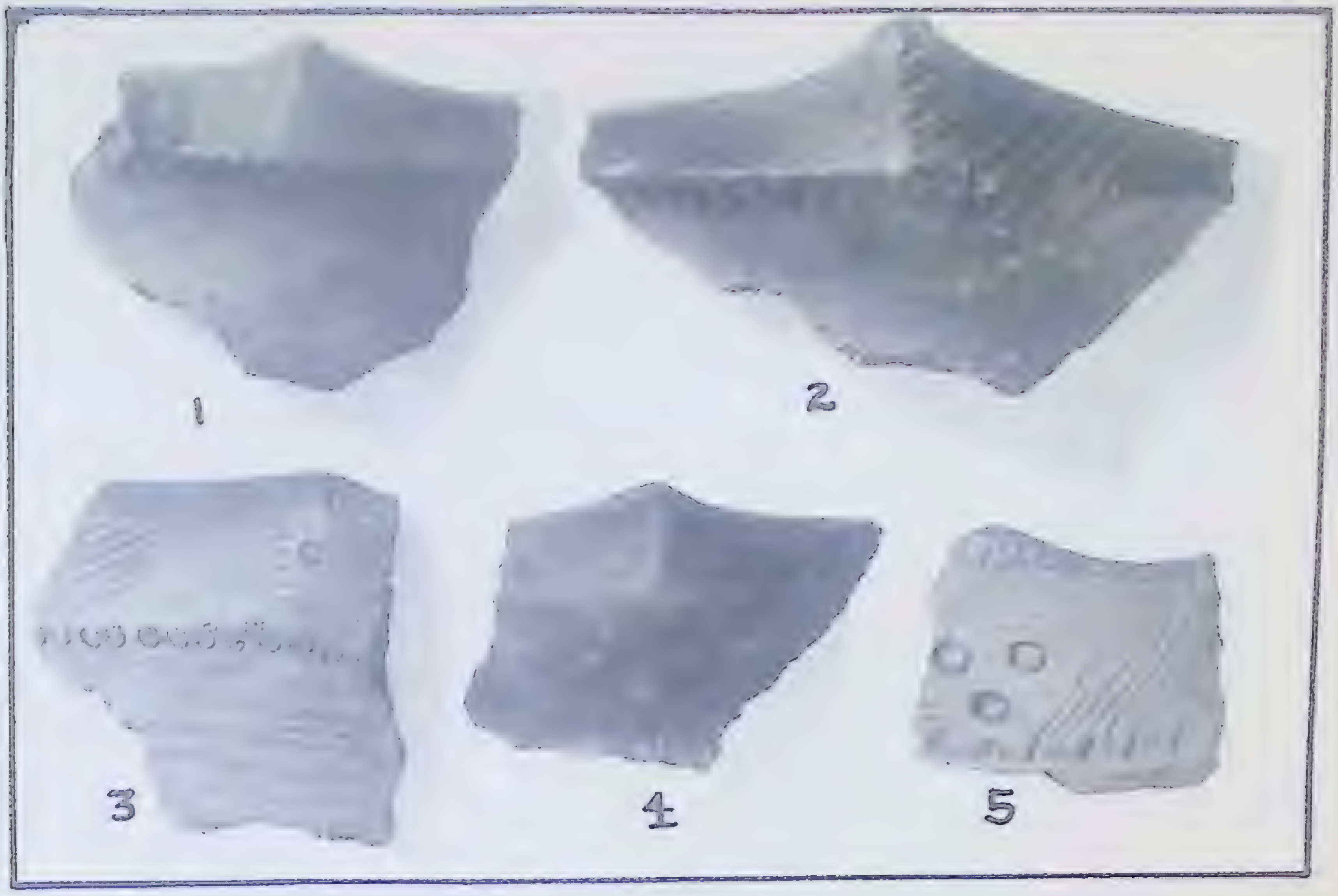
PLATE XI

Fig.

1. Castellation, Decorated Neck Type
2. Castellation, Incipient Turret Type
3. Castellation, Face Punctate Type
4. Castellation, Classic Pointed Type
5. Castellation, Face Punctate Type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